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The Practical Teacher's Art Monthly

May 1909

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Educational Opinion.

IN Circular 709 the Board of Education has at last taken a step in the direction so often and so insistently pointed out in these columns; and with the date at which another batch of fully trained teachers will issue from college imminent, the step is taken not a minute too soon. Roughly speaking, the Circular announces changes regarding the numerical values of various members of the school staff, the size of classes, and the supplementary teacher—changes which lead to what an enlightened educational policy declares to be the only goal—classes of moderate size, and a staff—an entire staff—fully trained and qualified. A recognised maximum of 60 for any one class, with the proviso that in *no case* will all the classes in a school be permitted to reach that size, but that the upper classes should be graded to 50, 45, or 40 children respectively—this gives grounds for hope and satisfaction; especially so when the announcements regarding staffing are read in conjunction. The lowering of the numerical values of each member of the staff, and the disappearance of the provisional assistant as counting in the school's equipment after July 31 next year, when he will follow the pupil teacher into the limbo of "unconsidered" trifles, will, with the class change mentioned above, help mightily in bringing about the introduction of an adequate and qualified staff into all the schools.

Circular 709.

* * *

QUITE in line with the advance just pointed out is the announcement that the standard of examinations for certificated and uncertificated teachers will be appreciably raised, and that after August 1, 1910, head-teachers must be trained or must have gained qualifications which are equivalent to a college training. This is quite right. The question of the schools is preeminently a question of the teacher, and any change which aims at improving the teaching corps, raising its status intellectually and professionally, should be welcomed with open arms by the profession. In saying this, we have nothing in our minds but sympathy and a good deal of admiration for the body of devoted teachers who have worked their way upwards and done yeoman service, though unweighted with college testimonials and experience. But an advancing age requires an advancing policy. As for the supplementary teacher, *he* dies on August 1 of this year, and *her* future existence is hedged about with many conditions and precautions. We confess that we should like to have seen provision made for the speedy euthanasia of the species, but we suppose that the embarrassments of authorities and the confusion of staffs which would have resulted acted as a deterrent. As it is, we must rest content with the possibilities of the hint given in the clause that "supplementaries" will be recognised only *from year to year*, and that authorities must make provision for them to study and qualify if they wish to keep them. In short, we welcome Circular 709 as an earnest of a better state of things.

Hope for the Collegian.

* * *

IN this connection it is interesting to read Mr. Runciman's reply to a question in the House concerning London trained students: "The number of students who left London County Council training colleges in July 1908 was 494. The number who had not obtained appointments when the replies to a circular issued December 31 were received was 153, but I believe a substantial number of those have since obtained employment." The right honourable gentleman had no figures regarding the number of appointments made to London schools between those dates, which is a pity. Also, had he been aware of some of the facts known to the writer of these lines as to the employment obtained by students who have passed with credit through a two years' college course and possess good college testimonials, he might perhaps have introduced some qualifications into his last phrase. Circular 709 may help to remove some of the disadvantages concealed in that final remark—and none too soon!

In the "House."

* * *

MR. HAROLD GORST has been "cursing" education in America. A friend kindly sent us the report of the function, in which Mr. Gorst appears to have repeated his coruscations at Cambridge and Oxford. The American reporter is more struck by the statement that London is full of useless 'varsity men than by anything else, not being able to verify the remark. The main thesis seems to have been the one with which we are all now familiar—namely, that we are all wrong, hopelessly wrong, and that the only way out is by Mr. Gorst's system of selective schools, in which children over seven can be sorted out into scientists, artists, engineers, or farmers, and educated accordingly. The classification does not seem to be exhaustive or mutually exclusive, but then one can hardly be logical and brilliant at the same time, especially in a public meeting. The paradox about a fact when learned driving out an idea was trotted out once more, to be laughed at by Dr. Maxwell, the New York superintendent. In short, the performance seems to have missed fire in America as in England, save the one startling statement about the park benches being crowded with university graduates. That made a hit, and was promptly given the place of honour in the report—as a leaded heavy scare headline.

The "Curse" in America.

* * *

AN almost incredible report is given in the American *Journal of Education* of schools of young criminals kept by imitators of "Fagin" in New York. These men have made a business of this nefarious training, establishing themselves in the guise of sweetstuff shopkeepers at the very doors of the higher elementary schools in order to watch for the brightest and best pupils, whom they lure into their dens and train for the work of criminals. The head of one school declared that she knew of no less than eight of such "Fagin" establishments in her own school district. According to the report the police are powerless to stop the business unless one of the young criminals happens to be caught redhanded. When arrested, the youths are tried in a juvenile court, and then, on the strength of the school record, are liberated on parole. What to do

Fagin redivivus.

BRITISH MUSEUM

with them then has been a puzzling matter, since they act as a veritable centre of contagion if they return to their schools. The attempt is now being made to cure their propensities by forming a special school for them, with extensive equipment for manual and physical training, but not to turn the school into a reformatory, which it is averred has always a deteriorating effect on these victims of moral obliquity and cruelty. It is difficult to believe that some means cannot be found of bringing to book once and for all the dastardly keepers of these kindergartens of crime.

* * *

THE movement to standardise grammatical terminology, and thus simplify the grammatical side of language study, is a move in the right direction. It continues the good work begun in the "parallel" grammars; and being in the hands of a committee headed by Professor Sonnenschein, there is a prospect of effective work being done. At present grammars are a maze of contradictions or ingenious confusions, even when one thinks of English grammars only. When one adds to them the grammars of other languages, on which the same sort of diseased ingenuity has been exercised, the difficulties born of confusion appear intolerable. Universal terminology is much to be desired. The state of mind of the grammarians reminds us of one of De Morgan's stories. A British sailor returned from his first trip into a foreign port, Cherbourg, and on being asked what he thought of it, replied, "The French, the fools, call a *cabbage* a *shoe!* Why can't they call it a cabbage when they know it is one?" Without falling into the sailor's blunder, we think the grammarians are like his Frenchmen.

To clarify Lindley Murray.

* * *

ONE of the most interesting reports we have seen for a long time has recently been submitted to the Education Committee of the London County Council. The fate of its recommendations will be followed with consuming interest, for they embody proposals which have for years past been urged on the attention of the public by those concerned at the huge wastage of educational effort caused by the drifting into the ranks of the unskilled of immense numbers of youths of both sexes. This wastage becomes apparent in the years immediately following school life. An inquiry into the occupations of pupils leaving school during the year ending July 31, 1908, from some 1,450 schools was made, and though the data are confessedly incomplete, the result of the inquiry is significant:—

At Last!

	Boys.	Per cent.	Girls.	Per cent.
Skilled employment....	8,662	33·2	13,755	58·1
Unskilled employment.	15,910	61·0	8,078	34·1
Higher education.....	1,524	5·8	1,861	7·8
Totals.....	26,096		23,694	
Unemployed or untraced	2,364		3,232	

The very small proportion who continued their education in the secondary schools is a bad sign. If these represent the cream of the elementary schools, then the cream is very thin, for less than 3,500 continuing scholars out of nearly 50,000 pupils is a most unsatisfactory state of things.

THE menacing point of the result is that 61 per cent. of the boys leaving school and 34 per cent. of the girls "drifted" into unskilled employments; for, as the report properly points out, the lack of discipline and training which that drift implies, continued during the first few years after school days are left behind, eventually fixes these hordes of pupils irrevocably in the class of unskilled labourers. So, while recognising the need for training those who enter skilled occupations, the report calls for drastic action respecting this immense class of the future unskilled. The proposals are so interesting that we extract them *verbatim*:—

Drastic Proposals.

"(*a*) The age of compulsory attendance at elementary schools to be raised to fifteen.

"(*b*) Certain children to be transferred at the age of thirteen to schools of a special industrial type.

"(*c*) Elementary school curriculum to be made more practical by a considerable increase in the time devoted to various kinds of manual training.

"(*d*) Local Education Authorities to be empowered to compel employers to allow their apprentices and learners 'time off' during the day to attend classes, and to enforce such attendance on the apprentices and learners.

"(*e*) At least half the working day to be spent in school.

"(*f*) All boys and girls not on the rolls of trade or secondary schools should be required to pass through a three years' course of 'half-time' instruction at continuation schools."

The most important of these proposals are those which suggest the raising of the age of compulsory attendance at school, and the suggestion of compulsory attendance at a continuation school, half-time, during the years of learning an occupation—that is, up to the age of seventeen or eighteen years.

* * *

IT is just during these years that the waste is greatest, and the widest mischief done; and it has often been pointed out in these columns that any measures which allowed the years between fourteen and eighteen to pass without any education or control would never touch the problem. The crux has always been to provide the means of compelling pupils to continue their studies. This it is proposed to do by acting through the employers. So that with a three years' training of a technical or trade kind for those wishing to enter definitely on a skilled occupation, and the education, presumably as practical as the conditions will allow, of even the lowest class of pupil, continued over the same three years, there ought to be a possibility of stemming the drift at present existing into the army of the unskilled, as well as improving the training of the skilled workman, now lost through the lapsing of the apprenticeship system.

For Stopping the "Drift."

It is clear that we are on the eve of great and significant movements. Every teacher will welcome any serious attempt to prevent the heartbreaking spectacle of seven, eight, or even nine years' devoted work in school, in thousands of cases yearly, cast to the winds and utterly lost.

The New Constructive Movement.

WHAT IS BEING DONE IN THE MOST PROGRESSIVE SCHOOLS TO MAKE THE PRIMARY TEACHING TOUCH EVERYDAY LIFE AT ALL POINTS.

I.—INTRODUCTION.

BY W. H. WINCH, M.A.

1. What does it mean?

THE Educational Chancelleries—to use a diplomatic term—of England, Germany, and America have for a long while been busy with notions of reform for elementary education; and now, for some time past, the movement has widened out, its principles have been discussed at teachers' conferences, on Education Committees, at training colleges, and in the schools themselves. In several of the latter, indeed, the movement has already begun to take shape in actual constructive courses and certain correlated changes in the rest of the curriculum.

What is this movement, and what are its principles? The Editor of *The Practical Teacher*, in consultation with me, has given it a name;* we call it "The New Constructive Movement." I think the title is eminently applicable, for—to us, at least—this constructive movement is not merely dependent upon a desire that children should learn to make useful objects, but upon the feeling that constructiveness on the part of the child is of the essence of education, whether that constructiveness is applied to woodwork, to clay modelling, to English composition, or to the invention of problems in arithmetic. We, then, whatever may be the case with some supporters of the movement, have no desire to limit the term constructiveness to the actual laying on of hands. Ours is an educational principle. The maker, whether of poetry or pottery, of music or mechanism, is, to us, to that extent, an educated person, because we believe that *making* not only brings dexterity and craft (a good English word which has degenerated in recent years), but knowledge and understanding.

It is not claimed that making is both the beginning and the end of education, nor that manual or any other dexterity is the one goal of all culture. In fact, the use of the term "culture" at once throws up the other side in strong relief. The cultured person is one who has been made rather than one who makes, and elementary school children should not be shut out from that side of the educational process. We are amongst the moderate persons who join a movement without subscribing to all the tenets of those who wave the largest banners. But let us not be misunderstood. We join it with no lukewarm feeling, nor just because we have to make up our minds somehow; we join it because we are of opinion that it is inevitably the next important step in primary education, and because we are of opinion that it is a necessary part, in varying degrees, of every education which aims at being all-round and comprehensive.

We have no intention, as may be feared is the case with certain politicians, of taking up this constructive movement in order to keep the poor in the workshop: they are not there now, so we can hardly *keep* them there. Perhaps the expression is a little strained, as political argument occasionally is. But we do deplore, in common with every reflective person, of whatever shade of politics he may be, that the boy of the large town leaves his elementary school and often spends years of aimless drifting even when he finally settles down into a life of real social utility. And it is thought that the elementary schools of England, by further attention to making and doing, can aid somewhat in promoting a more worthy ideal of work, and in increasing the interest and capacity of those who, after all, will never be likely to earn a living in what is called, somewhat snobbishly, a purely *intellectual* way. Again, it is needful to point out what is not meant. It is not meant that all superior elementary education should be developed into a system of trade schools.

2. How will it affect the Junior Technical School?

More junior technical schools we certainly must have (the expression "trade schools," by the way, throws the emphasis just where it should not rest—on the trade rather than on the technique), and we may find some day that *all* the children of the poor who are likely to distinguish themselves intellectually have been transferred to secondary schools; and some day we may have that interchange of pupils and teachers between schools of different types which will be the beginning of a really general system of education. Perhaps, when all this has been done, superior elementary education may be limited to technical work. For the present, however, we regard junior technical schools as a provision for one side, and one side only, of continued elementary education. It is hoped that we shall be able to inform our readers precisely what these trade schools mean—how their pupils are obtained, what they work at, and how the work done dovetails into, or prevents the development of, an apprenticeship system, or, perhaps, takes the place of that system as a bygone and rightly exploded educational method.

3. What will be its Immediate Effects on the Elementary School?

But these trade schools represent an upward limit of the Constructive Movement, and our readers are probably more interested in the changes, if any, which must

* Mr. Winch is too modest. The debt is on the other side, and he is the prime "mover" and the chief investigator in this important matter.—EDITOR.

take place within the curriculum of the elementary school itself. It is not necessary to argue nowadays that some forms of manual training are an integral part of all elementary school curricula. They are found in all, or nearly all, infants' schools; they are found in the closing years of all, or nearly all, senior schools. Strangely enough, there are too often *lacunæ* in the lower standards, great gaps in which the manual work of the infants' school fails to find a place, and *after* which, with much loss and lack of co-ordination, it is again taken up, to become woodwork, metalwork, laundry, and cookery.

To that problem, then, *The Practical Teacher* hopes to address itself first—namely, the problem that is known as that of manual training in the lower standards. It will be supposed in our articles, as certainly will be the case in England at present, that the teacher of the class will undertake the work. To me that is always the best way; for I fear, and have always feared, the disintegrating effect of the employment in elementary schools of specialist teachers, who owe allegiance, not to the school, but to their own external chiefs. Sometimes, doubtless, we must use them, but never where we can avoid it. And, secondly, the work must be such as can be done in ordinary classrooms and with such "tools"—let us not fight shy of the word "tool;" a pen or pencil is a tool—as children can really handle. The writers who from month to month will tell us what they have done in their own schools will, I hope, duly bear all these limitations in mind. If they do not, it will simply mean that their special experience will be of little use to us. But I think they will. We shall prescribe no particular form of dexterity or training. Everything which is constructive, or which is a necessary preparation to or accompaniment of constructive work, will find a place in our pages. Our one condition is that it be written for the *practical* teacher.

4. Is this Constructive Movement New?

So far I have tried to sketch in broad outline what is meant by the words "Constructive Movement." "But why call it 'new'?" I can hear experienced teachers of long service, much wisdom, and a little—just a *soupçon*—of cynicism, say. "We have had all this before. It is our old friend *hand and eye training*. We remember gathering in classes and cutting up coloured papers, till red squares and blue triangles—or was it *blue* squares and *red* triangles?—became an obsession. Children liked it, but what about *us*? Are we once more, as in former days under Ricks—that old stalwart now resting from the battle—to take up our scissors and work out paper patterns?"

Well, I think there is a difference in our views to-day—a difference which, in my judgment, is fundamental. We are aiming now that, in the main, the activities employed shall be constructive; they shall have a meaning in some completed product. It may be, of course, that we shall miss the mark, as we often do in education, if we shoot too directly at it; but we think there should be a mark—two marks, in fact: one, the satisfaction of the child in making things; the other, the satisfaction of the teacher that his pupils have made some definite steps in increased knowledge and constructive power. Our movement, then, is new in theory. Is it possible in practice?

5. Can a Child produce *THINGS* at the same Time that he is being trained?

So far there would be little disagreement among educational experts with any of the propositions we have laid down; but we are now on much more debatable ground. There is no evidence anywhere on the point now raised which is definite and conclusive. It cannot be got until experimental pedagogy has adequate support. We must fall back on argument, and we are prepared to hear all that can be urged on both sides.

England hitherto has definitely accepted the view that training is the thing; the making of objects, interesting or valuable in themselves, is a secondary consideration. America tends much more toward the opposite view. I shall have more to say about what is done in America, and exactly how it is done, later on; but for the present, looking at the matter very broadly, we can, without any hesitation, give the palm for finish and accuracy to English work, both in our schools and in the markets of the world. On the other hand, we fail in inventiveness and adaptability as compared with the American. Is this due to Nature or to nurture, to national differences or to educational differences? We do not know for certain, and never shall, until our educational authorities set themselves to find out these things. I can give an opinion—opinions are not knowledge, they are only guesses—and my guess is that the difference is rather more a natural one than a difference caused by teaching. But I attach weight also to the results of differences in teaching; and I hope—yes, and I believe—that we shall some day know in England how much influence to allow to each of these various causes, and that, when we do, we shall arrange our systems of teaching in accord with that knowledge. One more opinion: the English boy, as compared with the young German and the young American, is not deficient in ability, either in mechanical constructiveness or in natural dexterity. I believe him in some respects to be superior to both of them; and there are no fields awaiting educational cultivation in England which would enable us to reap a bigger harvest than these. Of course I include agricultural dexterities and constructiveness. And think for a moment of all that might be involved in happiness and strength if our deserted countryside could once again become the "breeder of men," and these huge, crowded, garish, gloomy, tunnelled towns could disgorge some of their human prey! Am I irrelevant? Well, if education did not mean all these things to me, I would not be an educationist. But let me get back to practice. Are we not, as a matter of fact, doing all that is needed at present in our elementary schools in the way of manual training? I have not mentioned drawing. Is that not manual training?

6. Is all Drawing Constructive Work?

Drawing certainly is manual training, and drawing of a kind is involved in nearly all constructive work, as we soon find out when we set about it. But it is the drawing of things as the things are, not as they appear to our vision to be. I cannot go into this question now at any length; the experimental work which will solve these questions for us has begun, and is already most fruitful. Suffice it to say that the analysis of the present sensory contribution out of the completed perception is, psychologically speaking, a very late performance. A child *can't*, without much help, separate what he sees from what he knows; and he wants at first to draw what he knows. The upshot of all which is—CONSTRUCTION AND CONSTRUCTIVE DRAWING BEFORE THE ACCURATE LINEAR REPRESENTATION OF OBJECTS.

The latest and most advanced acquisitions to the science of educational psychology thoroughly justify us both in asking for drawing and in asking for drawing which will apply to objects constructively; for merely graphic drawing, though it may be used by quite young children for illustrative and decorative purposes, is not an adequate substitute for constructive work. Perhaps we may contrive, in the course of the present articles, to show, among other things, what are the conditions which all truly constructive design must fulfil.

II.—A PRACTICAL SCHEME.*

BY CHARLES BIRD.

FOR each standard I have drawn up a series of models—a scheme of work in material. These models, wherever the materials allow it, are all useful articles or toys, and interesting from the children's point of view. The series is constantly being altered. One of the reasons for substituting fresh models for those already in the courses is the knowledge that the children do not like them. At present the lesson occupies one hour per week in Standards I. to IV., and the same kind of material is employed the whole year. If a longer time weekly were devoted to such work, different kinds of material could, I think, be advantageously used in the same year—say, one following another alternately. The time is about two and a half hours weekly for the handwork of the boys of Standards V. to VII., and the special grant is paid on this work. The material is plastic in the First Standard, cane in the Second, paper and thin cardboard in the Third, and wood cut with a knife in the Fourth. If, for any reason, the teachers prefer not to take the knife-work with the girls, they can take a second course of cardboard work. In passing, I may state that in my experience it is the *men* who think knife-work is "ridiculous," "nonsensical" (the selection of adjectives I have heard used is by no means exhausted) as a means of education for girls. The *lady* teachers are by no means so sure as to its being useless. As a matter of fact, I know several who are enthusiastic in its favour. A lady visitor of great experience told me the other day it was the finest thing for girls she had ever seen. After Standard IV. the boys take, or should take, the ordinary woodwork and the girls the domestic subjects.

The dominant note of the whole of the courses of models is simplicity. They depend for their beauty, if the charity of critics will allow any, upon good proportion and a simple outline adapted to the purpose for which they are intended, rather than upon elaborations of any kind. This simplicity is necessary; the work is to be the result of the children's own thought—the activities are to be self-directed and the experience gained to be really first-hand. The courses are used so as to stimulate the inventive faculty; the children are encouraged to use the class model merely as a standard, to which reference can be made to show essential features, etc., details being left to their own initiative.

The method of teaching is the same in each of the courses. The first model in each course is intended to be the simplest possible for the material—a little ball in the plastic media, a little mat in cane, a simple rule in wood, etc. The grading is by very easy steps, so that the least developed child can surmount the difficulties. As the teacher begins to find out the capacities and capabilities of the children, provision is made for the quicker ones by allowing them to miss models here and there, and so arrive at the more difficult ones more quickly. This method is adopted with classes working the same model and when each individual is doing a different one.

As an example of the manner of dealing with the handwork, let us take the first model of any course. This model is made by the teacher previous to the lesson, so that the children do not see how the work has been done. The model is shown to the children, and they are asked to tell all they can about it. Whatever information is given comes from *the children's own initiative*, not from the promptings of the teacher. It is evident that the more senses which are employed in conveying the impressions to the mind and the nearer the senses are to the object, the deeper and the more truthful will those impressions be. It is therefore reasonable that every sense be brought to bear that can be of service. The children are required to give expression to these impressions in clear and exact language. This part of the work is never omitted, but it is often deferred to the end of the lesson. Similar observational and critical lessons are taken on every tool, material, etc., employed in the work. It is very important that these expressions of sense impressions be encouraged by every possible means, and that, of course, in as many different ways as possible—by drawing, in material, by writing, painting, etc., but especially by *word*, the common method of intercourse between human beings. How loose and inexact the language of ordinary school children is!

It can generally be arranged that each child has a model, tool, piece of material, etc., in his hand when giving oral expression to his sense impressions. The children must be required to dig deeper and deeper into the matter as time goes by, till nothing is concealed that can be revealed. This ample and extensive, not to say profound, revelation of the object must come entirely from the children—they must *not* be told. It appears to me to be a sound principle to act upon that children should know "*everything about something*." Has the shallowness of the age of which one hears so much anything to do with beginning too soon to learn "*something about everything*"? Anyway, as the child is to be his own engineer in this matter, he must know all his senses can tell him of the thing, or the hiatus will cause illogical thinking and poor execution.

The model is thus reviewed and criticised from every aspect that the ingenuity of the children can devise. They are now required to draw it or get material and

* From an excellent paper on Educational Handwork read before the N.U.T. Conference at Morecambe.

make it, as the case may be. The teacher watches the proceedings with "masterly inactivity," as a Government inspector named one of my teacher's attitude the other day. When sufficient, reasonable and unreasonable, methods of attacking whatever problem awaits solution have been observed, the teacher calls a halt. The methods, tools used, etc., are all brought to the notice of the scholars and freely and critically discussed by them.

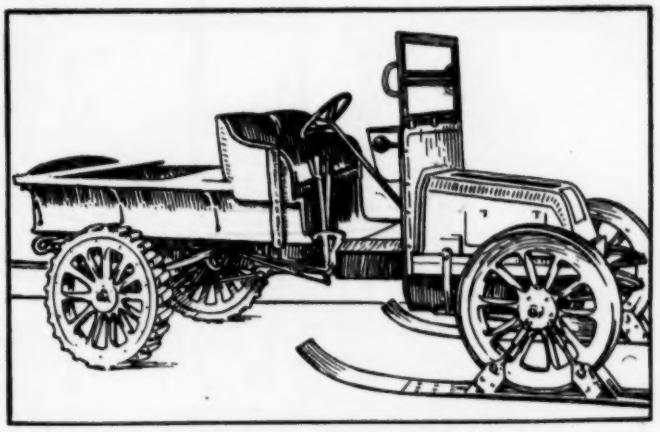
I think it very important that the teacher should not bias the children in their judgments. Each and all must, and will, take a part in questioning, in Socratic vein, the various methods brought to their notice; other methods also must be obtained from the children. There is a discoverable reason why one method is better than another, if it be better; one tool more adapted to the purpose in hand than another, etc. If we wish children to develop a reasonable judgment in all things, as we surely do, we must on no account discover for them what they can discover for themselves. And what can they not discover?

GEOGRAPHY NOTES UP-TO-DATE.

BY E. R. WETHEY, M.A., F.R.G.S.

The New Federated Malay States.

BY the treaty of March 1909 struck—after at least a year of "striking"—between Great Britain and Siam, an area of about twice the size of Wales has been added to the Empire. The annexed sketch-map shows the position of the most important of the new "Federated" Malay States—Kedah, Kelantan, and Trengganu (or Tring Kano, as some of the newspapers spell it). But little is known of our latest acquisition, nor has much been added to our knowledge since Mr. Hugh Clifford recounted his interesting journeys through Kelantan and Trengganu to the Royal Geographical Society so long ago as 1896 (see *Geographical Journal*, January 1897).* All three seem to possess some of the great Malayan commodity, *tin*, and to be ripe for agricultural development. They should have a future, too, for in the treaty is a clause which promises a through railway to Bangkok, towards which the Government of the Malay States guarantees £4,000,000.



THE ARROL-JOHNSTON MOTOR.—(*See page 562.*)

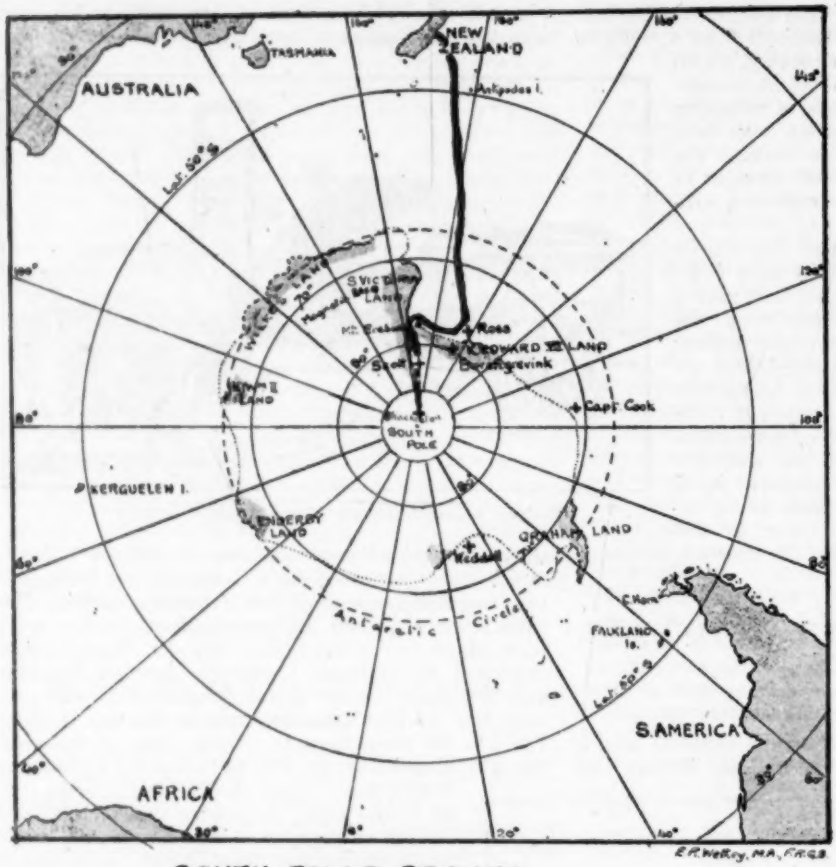
Antarctica.

Lieutenant Shackleton's achievement is one that appeals to all sorts and conditions of people, from the small school-girl, who is always looking out for a hero to worship, to the staid geographer who objects to blanks on maps. And of a truth Antarctica as yet is nothing but a series of "blanks." Nor do the "blanks" agree in the various atlases which boast plates of the South Polar Regions. Mere threads of coastline here and there, unbroken if the cartographer be of an enterprising spirit, broken more often if he be inclined to stern accuracy, they show little else but what a vast amount of ignorance there is amongst the savants as to this huge southern land-mass. In the compilation of the annexed map all sorts of compromises between authority A and authority B had to be struck, nor can it pose as anything more than an approximation as to where coast begins and sea-ice ends.

Farthest South!

The main points of note which stand out prominently in the recent expedition may be set forth chronologically as follows:—

* Mr. W. A. Graham, resident commissioner and adviser to the Rajah of Kelantan, published a small handbook of information on Kelantan in 1908; and the April number of the *Geographical Journal* (1909) contains an interesting *résumé*, with map, of what little is known of the three states.



SOUTH POLAR REGIONS.

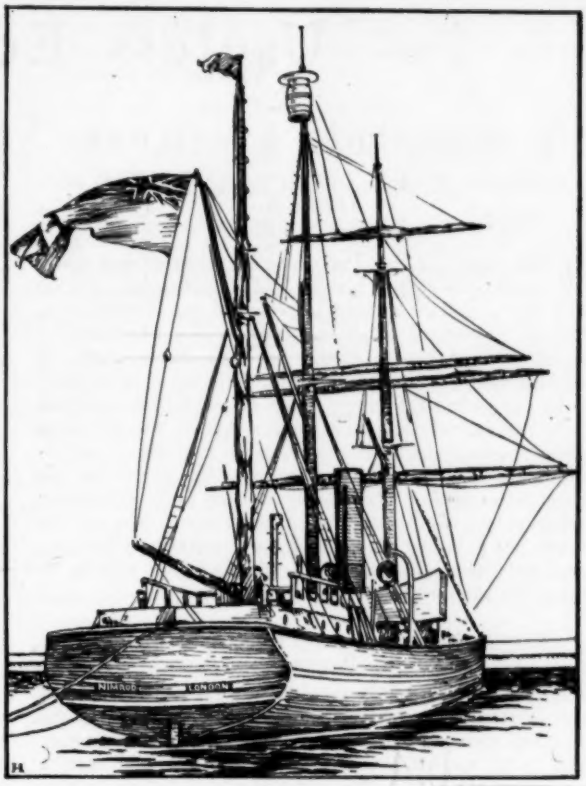
☐ Explored ☐ Unexplored. Scale of English miles.

1907. July 30. *Nimrod* left England.
1908. January 5. Winter quarters established at Cape Royds (under Mount Erebus).
March 5 to 10. Ascent of Mount Erebus.
March to October. Sledging expeditions and reconnaissances.
October 5. *First great Expedition.* Professor David and party started to find Magnetic Pole. January 16, 1909—Magnetic Pole found in lat. 72½° S., long. 154° E.
October 29. *Second great Expedition.* Shackleton and party started to find South Pole.
November 26. Scott's "farthest" reached.
December 7. Last of the ponies lost.
December 26. Nearing the end, on a plateau 10,000 feet above sea-level.
1909. January 9. FARTHEST SOUTH—lat. 88° 23′, long. 162° E.
March 4. Safe return of Shackleton's party.
March 23. First account of expedition's exploits telegraphed to England (*Daily Mail*) from Half Moon Bay, New Zealand.

To this short chronological summary one might with advantage add a note or two. 1. Lieutenant Shackleton was third officer on the *Discovery* in Scott's great expedition of 1902. Undoubtedly the experience he gained then was invaluable and was utilised to its fullest extent. The comparative ease with which Scott's "farthest" was reached and passed bears witness to this. 2. The *Nimrod*, an old sealing-vessel with a wonderful sheathing of oak, was quite a small boat — only some 227 tons register. 3. Cape Royds, named after a prominent member of the *Discovery* party, lies on the west side of Ross Island, north of Cape Armitage, where Scott had his headquarters. Away to the east of the island, as far as King Edward VII. Land, stretches the Great Ice Barrier Edge, in places over 200 feet high. It was this inaccessible barrier which prevented Shackleton from carrying out his original intention of landing on King Edward VII. Land, and which accounts for the sharp turn to the west on the map of the *Nimrod's* course south from New Zealand. The motor car appears to have been useful in expeditions to this quarter, though little use could be found for it over the difficult country farther south. "We found the Barrier surface impracticable for our motor sledge, but with the Arrol-Johnston motor did much useful work over the sea-ice, laying depôts and covering distances aggregating over 400 miles, in spite of temperatures varying from 4° to 60° of frost." One of the most interesting items of information to look forward to when Lieutenant Shackleton comes home will be the narrative of how the motor car behaved. It was built for the purpose, with back wheels shod with round bars of iron and front wheels mounted on runners. 4. The ascent of Mount Erebus was a great feat. On the summit was found a huge active crater half a mile in diameter and 800 feet deep. At the time it was ejecting steam and sulphurous gas to a height of 2,000 feet. 5. The expedition in search of the Magnetic Pole was undertaken by Professor David (Professor of Geology, Sydney University) and party. They had an adventurous journey both going and returning. Over terrible crevasses and drifted snow they eventually reached the island plateau 7,000 feet up, and found the object of their search. They got back to the foot of the plateau only to find their retreat cut off by the breaking-up of the sea-ice. As they had nothing left in the way of provisions but a few biscuits, the outlook was serious; but luckily the *Nimrod*, which was already searching for them, sighted their flag, and the rest was easy. They had travelled 1,260 miles in 122 days. 6. But the great expedition, after all, was the dash to the south. Shackleton took with him three men—Adams (Lieutenant, R.N.R.), Marshall (doctor),

and Wild—with four Manchurian ponies. Three of the ponies had to be shot for food—this alone gives a clue to the hardships which had to be undergone—and the fourth dropped down an unfathomable crevasse, all but carrying Wild with it. At Christmas time they were travelling over a plateau 10,000 feet high in the teeth of a blizzard blowing some 70 miles an hour! To get within 111 miles of the Pole itself was a wonderful feat; to return practically unscathed (1,708 miles in 126 days!) was perhaps even more wonderful. But they all suffered from dysentery, Marshall especially, and they were often within an ace of starvation as they retraced their steps to the various depôts of dead ponies they had established *en route*. Had they missed one—and how easy it would have been!—the ensuing relief expedition could have only brought back the tragic tale of another Franklin.

LIEUTENANT SHACKLETON.



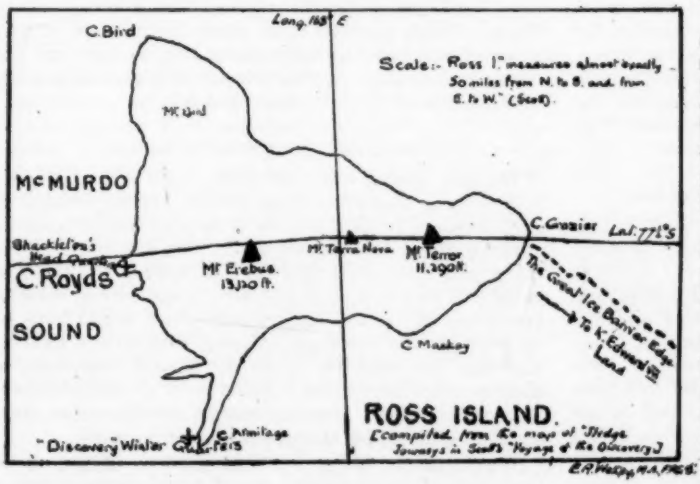
THE "NIMROD."

RESULTS OF THE EXPEDITION.

And the results—what of them? It is early yet to dogmatise on such matters, but certain items may be set down as additions to twentieth-century knowledge—to wit:—

1. That the South Pole is almost certainly on a plateau 10,000 to 11,000 feet high—that is, nearly as high as the plateau of Tibet.

2. That in the vicinity of this plateau there are several ranges of high mountains. (Shackleton mentions eight distinct ranges and numerous peaks and glaciers.)


C. Bird
Long. 165° E
Scale:- Ross I. measured almost equally 50 miles from N. to S. and from E. to W. (Scott).
Mt. Bird
McMURDO
C. Crozier
Lat. 77½° S.
Shackleton's Hut Depot
Mt. Terra Nova
Mt. Terror 11,290 ft.
Mt. Erebus 13,120 ft.
C. Royds
SOUND
The Great Ice Barrier Edge
To K. Edward VII Land
C. Mackay
ROSS ISLAND
Compiled from the maps of "Bridge Journeys in Scott's "Voyage of the Discovery"
"Discovery" Winter Quarters
C. Armitage
E. A. Wilson, M.A., F.R.G.S.

3. That the usual notion of an area of calm round the South Pole is probably wrong. (Compare the southerly blizzards mentioned above.)

4. That there are traces of a former *régime* of even greater cold than there is at present; and yet the various parties had occasionally to contend with 70° to 80° of frost, when men were frostbitten in their sleeping-bags, and at least one (Sir Philip Brocklehurst) lost one of his toes by unavoidable amputation. But perhaps this "greater cold" simply means a greater extent of the cold area—in other words, the ice of to-day is receding.

5. That *per contra* there are traces of a different climate ages ago, for coal was struck in lat. 85°—coal measures 1,500 feet, and seams 1 to 7 feet thick! Company promoters will perhaps take note of the fact, but may be reminded that comparisons with the Klondike are unfair, for the latter is 20° farther away from the North Pole than the former is from the South Pole.

6. That Mount Erebus has been ascended for the first time. The whole of Ross Island practically consists of volcanic matter from Erebus, Terror, Bird, and Terra Nova.

7. That the Magnetic Pole lies in lat. 72° 25′ S., and in long. 154° E. Professor David says it is no longer moving eastward, as in Ross's time, but is now travelling north-westward, in much the same direction as the North Magnetic Pole.

8. That certain forms of life can be frozen up for years, and yet when thawed out are as lively as ever. This refers to the microscopic rotifers found in fresh-water lakes near Cape Royds.

(To be continued.)

Useless Education.

I.—EDUCATION A FAILURE!

TAKING STOCK OF OUR EDUCATIONAL SYSTEM.

BY JOHN PERKINS.

THE report of the Poor Law Commission has many sides—it covers a wide field. Education, *per se*, did not come within the purview of the Commission, but the important social questions remitted to them by royal warrant are so bound up with our educational system that it would have been impossible to exclude it in suggesting reforms. As a rule, educationists have only considered that part of the report which makes drastic recommendations as regards the school curriculum, but it will be my endeavour in the course of this short series to show that the teacher has to do with many other points of this reforming document. We are too much given, surely, to limiting our outlook and horizon, and we often fail, in laying our plans for reform, to recognise the fact that

Education is but one Phase of the Social System.

This report of 1,238 printed foolscap pages, the outcome of three years of patient labour, involving the analysis of evidence which will run to forty volumes, will in all probability form the basis of much of the social reform of the next generation. It seems incumbent, then, that we should be alive to the appalling disclosures made, and that we should examine judicially its drastic recommendations, so that we may be enabled to adjust our educational system (including the curriculum) to the social needs of the time and to keep abreast with the advances of our civilisation. The reformers of the future will not be able to deal with each phase of the social problem as if it were enclosed in a watertight compartment, but they will be compelled to consider the bearing of each upon the problem as a whole. In this light, then, we shall overhaul the report, glean the opinions of those in authority, examine the evidence upon which the recommendations are based, endeavour to discover how far we need to overhaul our educational system and present recommendations for any improvements which may be found necessary. In undertaking this task, we do not intend to take

The Lawyer's Advice to admit Nothing.

From our professional point of view the outstanding feature of the report is its condemnation of the primary curriculum. "*There seems to be, outside the circle of the teaching profession, a very strong general feeling that the education of our children is not of the kind which is helpful to them in after life.....We would suggest to the Board of Education the advisability of meeting these criticisms by a thorough reconsideration of the time-table and curriculum in our elementary schools as well as the aims and ideals of elementary education.*" Now we school people are very apt to be hypersensitive of *outside* criticism, or rather what we consider to be outside criticism. We too commonly indulge in a sneer of superiority when the mere layman ventures to unburden himself in matters educational. Are we not all too ready to exclaim, "What does *he* know about it?" Personally I have long been of opinion that the training of the teacher should not be considered complete until he has worked for some appreciable period in the industrial or business world. By this means, and by continually keeping in touch with outside affairs, the teacher might claim to have some definite knowledge of the future needs of the children who come under his care, and would be the more ready to admit that the man of the world outside might be able to offer valuable suggestions in regard to the school work.

It is not necessary for one to go all the way with the Commissioners, nor is it necessary to condemn our present curriculum root and branch, if one is constrained to observe that, after all, the prime concern with most of the children when they become the men and women of to-morrow will be that

They must earn their Bread and Butter.

At the moment I am not permitting myself to discuss the ways and means, nor to consider the various nostrums advanced for the improvement of the syllabus of primary school instruction. It needs very little acquaintance with the history of elementary education to know that it is only necessary for some one in authority to raise a scare concerning some flaw or omission in the list of school subjects and we all with one consent accept the situation and scramble over one another in our endeavour to adopt the prescribed remedy. There are an excess of haste and a lack of perspective in the promotion of many of these changes.

Get a big drum, beat it loud enough, and you will soon gather a crowd. And so it is with those who can see the millennium advanced by their pet nostrum.

Nature study was to stem the rural exodus, physical drill was to improve the national physique, moral instruction was to inculcate the manners which "makyth man;" and so it will be with this latest demand for a reformed curriculum, unless we change materially. And here, incidentally, let me explain that I do not decry Nature study, physical drill, moral instruction, or any other of our syllabus subjects so long as they are not considered as ends in themselves. We need remember in this question of curriculum that it is

The Spirit that giveth Life.

We may model our curriculum upon ideal lines, we may arrange our time-tables so that the importance of each subject is adjusted to a nicety, but it matters nothing unless the teacher enters into the spirit of the thing, and remembers that his dual task is to teach the child how to live and to put him in the way of earning his living—or, as the modern schoolmen would have it, he must receive adequate training both in the humanities and the realities. I do not intend, therefore, to dismiss the Commission's indictment as though there were nothing in it, but this curriculum discussion must stand over for fuller treatment in another issue.

There will probably be very general agreement to that part of the majority report which recommends a very considerable raising of the age of attendance exemption, a matter in which the minority report is much more advanced. If there is anywhere a serious

BREAKDOWN IN OUR EDUCATIONAL SYSTEM

it is at the age of exemption for compulsory attendance at school.* At five years of age or thereabouts the State commences to take an interest in the educational well-being of the child, and he is forced into the school and there compelled to adapt himself to the circumstances and to the curriculum—yes, he is made to fit the curriculum!—until he reaches the age limit, and then "Good-bye." Generally speaking—and universally so far as the State is concerned—he may do as he likes and go where he will until, possibly unemployed or unemployable, he once again falls back upon the State and in one form or another endeavours to obtain relief. There is, then, a definite hiatus between the time of leaving school and that of reaching man's estate—the period of adolescence—and to fill this break some system of supervision and instruction must be instituted. In this direction the report is fruitful in recommendations as to what is desirable.

The proposals advanced to meet changing conditions of employment also cannot be ignored by the teacher whose horizon is not limited by the four walls of the school. If labour exchanges are instituted as recommended, we must demand in association with them some system of

AFTER-CARE COMMITTEES FOR NORMAL CHILDREN.

Earnest teachers know only full well how difficult it is to find suitable employment for the children leaving school, and to keep in touch with them when work is obtained. It seems a remarkable thing that every care is bestowed upon children who are mentally, morally, or physically deficient, while we neglect those who are normal. The abnormal are taught in small classes upon an approved—and improved—system, and watched and tended by some organisation from the cradle to the grave. So it is with those who are mentally above the average: they have scholarships, an extended and individualised education, and are afforded opportunity at every turn. The vast majority that remain—fully 90 per cent.—who will form the backbone of the nation, are taught in classes still so large that they are—necessarily and unavoidably—

MENTALLY STUNTED BY THE SCHOOL ROUTINE,

and when they leave are largely left to fend for themselves. And to this is due, probably, much of the after evils of unemployment and distress.

These are not the only questions which this report of the age thrusts upon our attention. There are the care of the children in sanitary homes, their proper and adequate feeding, their moral environment, the provision of medical treatment, the inculcation of habits of thrift, compulsory continuation classes, and even compulsory military training—all bearing directly or indirectly upon the work in which we are engaged. But for the moment I will quote from a Memorandum on Unemployment by one of the Commissioners (Mr. T. Hancock Nunn), which is attached to the report, and leave it to future papers to develop its manysidedness:—

"EDUCATION COSTS A GREAT DEAL ALREADY.

IT IS GOING TO COST MORE.

BUT IT WILL NEVER COST SO MUCH AS THE NEGLECT OF IT WOULD COST. NO CHANGE IN THE POOR LAW WILL HAVE THE SAME DIRECT RESULTS IN PREVENTING DISTRESS AS WILL A MODIFICATION OF THE EDUCATION ACTS. IN A WORD, THE PROBLEM OF PREVENTING UNEMPLOYMENT IS FUNDAMENTALLY AN EDUCATIONAL PROBLEM, AND AS SUCH IT SHOULD BE TREATED."

* Since this was written this point has been emphasised by the Bishop of Manchester in his speech at the N.U.T. Conference on Easter Monday.

II.—THE VAN BOY.

BY AN INSPECTOR OF SCHOOLS.

"THE boy, what will he become?" Who of my readers does not recollect this famous cartoon of the late 'eighties published in connection with that worthy series, *The Popular Educator*? The picture impressively portrayed alternative stages of life dependent on the fateful choice of good or evil, and ending in either an honoured or a shameful old age. "Train up a child in the way he should go, and when he is old he will be sure to depart therefrom," is the cynic's travesty of the wise proverb.

Let us consider the question of the boy in a judicial manner, eliminating accidentals.

We are not exactly living in the days of Samuel Smiles and of the successful merchant who broke away from the ruck by picking up pins.

No one recognises the importance of developing self-reliance in children more than I, and such training is more than ever necessary; but what we have to appreciate is the appalling fact that right from the start, quite irrespective of character, the mass of our elementary schoolboys, as one glorious result of our vaunted civilisation, are condemned to eke out a hopelessly humdrum existence on a bare living wage. As a *Practical Teacher* contributor pertinently asked last month, Why should not a van boy become a Poor Law Commissioner? Why not? But what of the odd million or so?

Every year about 200,000 boys step out into life from the elementary schools, and Mr. Cyril Jackson, the Poor Law Commissioners' Special Investigator, says that 70 per cent. to 80 per cent. enter blind-alley, uneducative employment.

A Parliamentary return (1899) shows that in London, out of 24,145 boys, 10,283 became errand boys, etc., and 4,476—or less than one in six—entered skilled trades. The same return gives for the large urban and manufacturing districts 16,127 entering blind-alley, uneducative occupations out of 45,996.

This boy-labour evil "owes its rise in the main to the enormous growth of cities as distributive centres—chiefly, and most disastrously, London—giving innumerable openings for errand boys, milk boys, office and shop boys, bookstall boys, van, lorry, and trace boys, street sellers, etc." These occupations are often detrimental to physical development, owing to long hours and long periods of standing, walking, or mere waiting. Morally they are frequently injurious, especially on account of the irregular life and lack of discipline "during the critical years of adolescence, when stimulating instruction and well-directed guidance in matters of conduct and personal hygiene are often most needed, and, if wisely given, most helpful towards healthy living and self-control" (Sadler).

Mr. Sidney Webb, in his valuable evidence before the recent Commission, draws attention to several phases of this trouble:—

1. The evil of recruiting a chronically excessive army of unskilled, casually employed, merely brute labour.

2. The illegitimate use by employers of successive relays of boys as cheap substitutes for adult workers.

3. The failure to maintain the physique of the town boy, whose long hours and monotonous work leave him a weedy, pigeon-chested young man, rejected even by the recruiting sergeant.

4. The creation of the "hooligan"—the undisciplined youth, precocious in evil, earning at seventeen or eighteen more wages than suffice to keep him independent of home control, and yet unsteadied by a man's responsibilities.

Roughly speaking, then, we have two general types of boy-labour :—

1. The van or errand boy, engaged in distribution.

2. The factory boy, engaged in the place of his father, so to speak.

Here are descriptions of the first type :—

"The van boy sits behind to prevent things being stolen. Such boys earn six shillings a week. We have all seen the little fellows. The professional name for this kind of work is 'nippering.' It is highly unhealthy work owing to constant exposure to the weather. I have seen more miserable faces—consumption, incipient or developed, written over them in large letters—amongst the 'nippers' than amongst any other class of boys" (Sherard's *Child Slaves*, p. 41).

But for the most up-to-date specimen of this *genus* commend me to the lorry boy—the *casual* apprentice engaged and paid by lorrymen. Of him Mr. Tawney, giving evidence before the recent Commission, says: "The boy has to go down to the yard and wait there till his man comes in to take the lorry out. A group of such (lorry boys and trace boys) can be seen in the neighbourhood of any large contractor, loafing and playing cards on the pavement. There is no obligation on the man to take the same boy with him every day, nor does the obligation on the boy to put in an appearance seem to be very strict. A firm may employ eighty lorry boys and not be able at any given moment to say where forty of them are. Hence these boys rarely stay with the same firm for more than a few weeks at a time, but go from one to another much as they please, till they are not fit to be taken on as vanmen when they grow up. Out of 148 lorrymen employed by a firm examined, only one had been with the firm as a boy. In short, the opinion seems to be universal that this particular kind of work gets into the hands of a low class of boys and still further demoralises them" (Poor Law Report, Part VI., Chapter I., § 141).

In 1901 the Government employed 7,684 boy messengers under sixteen years of age, and the great majority of these were compelled to leave at sixteen.

Under the second head named above we have the cases of "boys who, on leaving school, enter without apprenticeship into trades where there are no possible openings for them when grown up—loom boys, doffers, shifters in the cotton and woollen trades (where it is said there is little possibility of more than one in ten being ultimately absorbed), rivet boys in shipbuilding, drawers-off in saw mills, packers in soap-works, etc. In many of these trades they are tempted by high wages (a rivet boy on the Clyde, for instance, may earn 20s. a week) to remain till they are too old to enter any other regular occupation" (Report, p. 326).

"The evidence seems conclusive that in the woollen centres the bulk of the boys have to leave the mills between sixteen and twenty for some other work; and though the regular hours and work of a mill have probably been a better training than the casual work of an errand boy, it is still the case that they are thrown on to the unskilled labour market without any special aptitude" (Jackson's Report on Boy Labour, p. 30).

This misuse of boy labour is indicative of the growing tendency for certain industrial functions to be transferred from men to boys, and this is especially the case when manufacturing processes and industrial organisation are rapidly changing. And so we arrive at the difficulty of the over-employment of boys and the under-employment of men.

The Commissioners tell us that the used-up blind-alley boys dispose themselves thus: "The army absorbs a large number, the mercantile marine gains a few; some get into low-skilled trades; but many—we fear a majority—have no other outlook than casual labouring and chronic unemployment, from which it is inevitable that a certain proportion should become unemployable" (Report, p. 1,167).

The Toynbee Hall Report on Boy Labour, in dealing with the fate of boys formerly employed in London printing-houses "laying on" and "taking off" paper, states that some enter the army and others take to the docks. "A large number of printers' labourers were found in the Whitechapel Casual Ward in the course of an investigation made into the previous employment of the men there."

As evidence of the demoralising effect of this condition of things take these statements :—

"Street selling makes the boys thieves" (Chief Constable of Sheffield). "Newsboys and street sellers are practically all gamblers" (Mr. Cyril Jackson).

"Of 1,454 youths between fourteen and twenty-one charged in Glasgow during 1906 with theft and other offences inferring dishonesty, 1,208, or 83·7, came from the class of messengers, street traders, etc." (Mr. Tawney).

"The theory that boys can become errand boys for a year or two and then enter skilled trades cannot be maintained. The great mass of them fall into the low-skilled trades or wholly casual labour" (Poor Law Report, p. 325).

"We have at the present time in Great Britain over three million boys (thirteen to eighteen) of whom, one-quarter to one-half a million are under good influences outside their school walls.

3,740,000 boys.
300,000 under good influence.
Remainder = 3,440,000 independent of such."
(Lieut-General Baden Powell, C.B.)

Modern social and industrial conditions are largely responsible for the boy-labour curse. The more highly civilised we become, the more are our casual needs. Year by year the demands increase, as also does the hustling, resulting in a larger number of odd jobs being done in a given time.

"Every message starts a boy. Every parcel hurried, every bit of latest news, every pressure for the quickened movement of affairs is a call for boys. Out they pour, in armies, in mobs, to ply in our service" (Canon Scott Holland).

"Think of the flying London newsboy, dashing recklessly, if skilfully, along, as he steers his bicycle through the maze of Piccadilly-to-Bank traffic, hurrying the latest betting news or a cup-tie result to anxious thousands. Industrially the uncanny haste for rapid production and other influences have wellnigh finished apprenticeship. Specialisation has become the rule in large industries, and under such conditions the firms will not trouble to train apprentices. In London, we are told,

it is extremely difficult for even the most careful parent to find his boy a situation involving training for skilled work. Many employers refuse to take apprentices, and man their works with recruits from the country. The evil is on the increase, being a natural result of the substitution of large firms and large works for separate employers. Side by side with these adverse social conditions we have, in numbers of cases, gross carelessness on the part of the parents in selecting suitable occupations. Often less care is taken in choosing the boy's first berth than in buying him a new suit of clothes. The almost universal experience is that in large towns boys, owing to carelessness or selfishness on the part of the parents or their own want of knowledge and forethought—for the parents very often have little voice in the matter—plunge haphazard, immediately on leaving school, into occupations in which there is no future" (Poor Law Report, p. 325).

The irregularity connected with much of this work suits the temperament of the average boy who has arrived at the Robin Hood stage of his existence. Regarded from different standpoints, these energy-charged, romantic lads are living examples either of the gospel truth, "Take therefore no thought for the morrow, for the morrow shall take thought for the things of itself. Sufficient unto the day is the evil thereof"—or of the epicurean canon, "Let us eat and drink, for to-morrow we die."

This preliminary survey of the van-boy problem will hardly be complete without some reference to an important avenue into uneducative employment. About 200,000 children in attendance at our primary schools are regularly employed in various wage-earning occupations out of school hours (Report of Inter-Departmental Commission, 1901). These are employed before school in the morning, after school in the evening, sometimes also in the middle of the day, and often during the whole of Saturday. The transition of the boy worker from his out-of-school employment to some form of irregular work on leaving school may be actually unbroken. Indeed, the former condition is a predisposing cause of the latter; for the day-school wage-earner will generally be less perfectly educated than his more fortunate *confrères*, and so will the more easily drop into an irregular job on leaving school. Moreover, there will be a natural tendency in many cases to continue, after school days, in an environment with which a boy has become previously familiar.

NEXT MONTH.

1. Further Examination of the Evidence laid before the Poor Law Commissioners.

2. A helpful Article by C. T. Hunt, Dulwich Hamlet School, on "Constructive Work for the Lowest Standards."

3. A full Review of H. W. Lucy's "Sixty Years in the Wilderness."

4. The concluding Paper by A. E. Roberts, M.A., on "The Praise of Famous Men," unavoidably held over this month.

5. A helpful Needlework Paper for Teachers in girls' schools.

III.—THE PRIMARY SCHOOL AS A PREPARATION FOR THE SECONDARY.

BY A SECONDARY TEACHER.

I HAVE been asked by the Editor, as a teacher in a municipal secondary school, to express an opinion upon the present state of primary education in its relation to the secondary school. As a member of the staff of a school, situated in the heart of an industrial community, 99 per cent. of whose scholars pass into it by way of the primary school, I have perhaps unique opportunities of comparing year by year the finished products of the primary school.

Has the great movement in primary education towards freedom from examinations and liberty of choice of curriculum justified all that its supporters claim for it? Do the pupils of to-day show the initiative and self-reliance, the desire for knowledge, that one might reasonably expect from the improvements which we are assured have taken place in our primary schools?

After some years' experience one is regretfully compelled to answer in the negative. The average pupil of to-day has a smattering of many things, a real knowledge of none. His mental attitude is one of passive receptivity. As a general rule he has been taught *at* from 9 a.m. until 4 p.m., and always with a view to pretty copy-books on his own part and a beautiful record-book on the part of the teacher. There is too much teaching done nowadays and too little initiative on the part of the pupil. This system is bad for both teacher and pupil. The former has too much *ego* in his cosmos, the latter too little. Hence it is that to a large extent we find the pupil adopting the attitude of a passive spectator towards a theoretically beautiful educational experiment.

We see the results of this system very quickly indeed when the pupils are placed for the first time in a laboratory. In the majority of cases the pupils assure you that they have been taught the metric system of measurement, but as soon as a metric rule is put into their hands and they are requested to measure the simplest objects, one realises that their knowledge is a vain thing.

A few weeks ago the writer asked a scholarship class, newly recruited from the primary school, to multiply 27·39 by 2·739. Very few had any idea of the approximate result. A fair number worked the sum accurately. The class was then asked to multiply 27·39 by 27·39. In thirty-two cases out of thirty-five the sum was worked from the beginning.

In the English lessons of this class essay-writing had been a prominent feature, yet when a simple experiment was performed before them, and they were asked to describe it, the attempts were exceedingly poor. The same class could discourse beautifully on "How I spent my Holidays."

The old method of teaching drawing in the primary schools has been condemned as dull and uninteresting. Doubtless it was, but it at least conduced to a knowledge of form. We turn out our primary school children nowadays totally incapable of making a presentable sketch of a simple piece of apparatus or of part of a machine.

I confess that when I find on an average 30 per cent. of a class with varying answers to a simple sum, unable to enunciate distinctly, or to copy a letter accurately,

I feel a sneaking sympathy for the merchant who condemns the whole system because of the inaccuracy of his office boy.

This lack of thoroughness, self-reliance, and manipulative power on the part of the pupil is the great drawback of the present system, and in my opinion is due to three distinct causes—(1) poor staffing; (2) liberty of choice in the curriculum developing on the lines of pure individualism; (3) the want of some examination test in the senior classes of the primary school.

As one who taught in an elementary school in the dark period of the "noughts and crosses," and also saw the dawn of what seemed to be better times, I have every sympathy with the teacher struggling under adverse conditions with an unwieldy class.

But I am compelled to ask whether the primary school teacher of the present day is as good as his predecessor. It is most unfortunate that the movement towards greater freedom in the curriculum should have coincided with the general lowering in the standard of examination required for the certificate of the primary school teacher. It used to be the proud boast of the profession, on the authority of the late Chief Inspector, Mr. Sharp, that the standard of the "certificate" was in many cases equivalent to that of the B.A. degree. The lowering of this standard has slowly but surely done its work, and the result is that, viewed as a whole, the men and women in our elementary schools to-day have neither the individuality, so valuable in class discipline, nor the attainments specialised to the same degree as their predecessors of the 'seventies and 'eighties. This, combined with the degeneration of liberty of curriculum into licence, the fetish of the record-book fostered in many instances by the Inspector, and the want of some test of the merits of the work done, is undoubtedly responsible for much of the slipshod work of our primary schools. As a remedy for these evils I would advocate:—

1. The raising of the standard of the certificate, the abolition of the supplementary nondescript, and the lowering of the number of pupils in the class.

2. Uniformity of curriculum, especially over large industrial areas, suitable to the educational needs of the district.

3. The reintroduction into the upper classes of the primary school of a modified form of examination.

The first of these suggestions needs little recommendation; the economic conditions are already beginning to manifest themselves in an overcrowded market, insufficient salaries, and staffs largely composed of supplementary teachers. A few years will probably see the standard of the certificate raised, and the elimination of the supplementary teacher well under way.

Uniformity of curriculum is also necessary, particularly in large centres. At present we have pupils entering our secondary schools with little or no knowledge of English grammar; girls with no knowledge of geography—anomalies to a large extent the result of the faddism of the head teacher of their primary school. With such variation, classification is extremely difficult, and the pupil in many cases is severely handicapped. Many teachers view with disfavour the attempt to introduce anything like rigidity into the curriculum, but a certain amount of uniformity is necessary in the interests of the pupils. Uniformity of curriculum does not necessarily destroy diversity in teaching method.

I cannot view with favour the suggestions advanced for a limitation of the curriculum. The days of the three "R's" are happily gone. The evil of the present system lies in the fact that subjects are taught in separate compartments.

Scientific correlation of the school course would unify the primary school scheme—for example, arithmetic, practical exercises in geometry and mensuration leading to generalisation in algebraic form, might be grouped as a subject, "Elementary Mathematics." History and geography could be linked in like manner. Such a scheme, thoughtfully carried out, would do away with much of the scrappiness of the present system. A good deal of the work might also be more practical. At present the handicraft lessons alone provide an outlet for the characteristic energy of the British boy or girl. Schemes of Nature study and elementary science lessons may often provide the teacher with an opportunity of displaying teaching power; but as a general rule the science lesson in the elementary school is very unsatisfactory, and might with advantage be postponed until the pupil reaches the secondary school. A much better method would be the introduction of a simple course in practical measurement and weighing, such as is at present followed in the first term in the secondary school. The apparatus for such a course could be largely made in the workshop, and a laboratory is not a *sine quâ non*.

Many of the best teachers in our primary schools are beginning to recognise the necessity for the reintroduction of some form of examination in the upper classes.

An examination set in conjunction with the teacher, and largely controlled by a board of teachers, can be made a very valuable factor in education. That many teachers recognise its value has been shown in recent years by the entry of large numbers of primary schools into the Oxford and Cambridge Locals, College of Preceptors Exams, etc.; and I am assured by those head teachers who have entered pupils for these examinations that they act as a very valuable incentive to the pupils themselves.

There is one other point in which the primary school is weak—in its attitude towards home work. In the secondary school it is absolutely necessary, and indeed is insisted upon by the Board of Education. One of the greatest difficulties we have to contend against is the attitude of the new pupil and his parents towards home lessons. In evening continuation schools and in evening secondary schools it is next to impossible to obtain home work regularly and satisfactorily done. Much of this evil lies at the door of the primary school.*

* Will any reader answer our contributor?—ED.

ILLUSTRATIONS OF HISTORY TEACHING.

AT the William Ellis School, London, a room is being specially equipped for the teaching of History. Horizontally, round two sides of the room, runs a Time Chart divided by perpendicular lines into equal panels, each of which refers to a century. Each panel is being hung with maps, portraits, pictures of buildings, facsimiles of documents, etc., illustrating the history of the century. Mr. E. Bruce Forrest is the originator of the idea of a School History Room, and is carrying out the scheme. The Art for Schools Association (Passmore Edwards Settlement, Tavistock Place, W.C.) is assisting him in the choice of pictures and of other illustrations. The Editor hopes to present to his readers in a future number an illustrated article describing the above experiment more fully. The establishment of an "English" room on somewhat similar lines has already been advocated in these columns by Mr. A. E. Roberts, M.A.

IN HONOUR OF HANS ANDERSEN.

BY W. T. GOODE, M.A.

PEOPLE are apt to think that the art of story-telling is among the lost arts, but after one has heard and seen Miss Marie Shedlock one has hopes of the revival of what must have been one of the very earliest arts—at once literary, poetic, and dramatic.

Such was, at least, the opinion of some seven hundred students and teachers who enjoyed the rare treat of an evening with Miss Shedlock in the Birkbeck College Theatre on February 27. The occasion of the gathering was, to use an Irishism, Hans Andersen's birthday, which falls on April 2. But as one can't conceive an Andersen celebration which does not include Miss Shedlock, and as she was not free on the anniversary day, the celebration was merely antedated. *Voilà!* rarely does it happen that event and celebrator are matched so beautifully.

As a *diseuse* Miss Shedlock is unique. She thrills with sympathy from head to foot, and verily seems to enter with keen physical as well as mental enjoyment into the beauty or humour of the stories she tells. She never over-emphasises; never for one moment does the *diseuse* pass into the elocutionist. She is the story-teller pure and simple from first to last.

She possesses that rare power—it belongs only to artists of the very first quality—of employing gesture so fitly that, even while the amount of it is of the slightest, the little movement calls up exactly the picture she is trying to present. Add to that a wonderfully flexible voice, capable of conveying a whole range of feeling, an extremely mobile and expressive countenance, and it can be readily believed that in listening to Miss Shedlock, the people, animals, even the inanimate objects, endowed for the moment with speech by Andersen pass before one's eyes in a panoramic vision of the story.

She was in great form on the 27th, and within two minutes of opening she had the large audience rippling with good-humour and excited anticipation as she declared that, like a German savant who had spent a long life in observation of the brain of a mosquito, but at the end declared that had he "restricted the field of his work" he would have done better, she too had restricted the field of her lecture for the evening. She had omitted all the biographical part, assuming that any intelligent audience could supply the omission for itself, and thus she was able to devote her time to regarding Andersen from various points of view, and, what was much more important in the eyes of the audience, illustrating the points of view plentifully. The size and evident gusto of the audience delighted her, and quite rehabilitated England in her estimation as a lover of Andersen, seeing that in New York, and even Chicago—usually associated with pork and highway robbers—work had been stopped in previous years to celebrate the anniversary of the great story-writer.

With exquisitely light touch she ran over Andersen's qualities as a story-writer—for all his other works were put aside for this celebration—his horror of cheap fun and of satire, his love of drama, and the singularly convincing way in which he makes animals, and even inanimate objects, talk—always within the conditions of their *rôle*. And each quality as it was ticked off and described was indelibly impressed on the minds of the audience by a daintily-told illustration, an excerpt from some one of the stories. Is it possible for any one to tell the episodes of the Storks, of the Rose and the Snail, with a more exquisite sense of their values? or the Garter and the Shirt Collar, after a bantering interlude on the "Pot and the Kettle" and "Hey Diddle Diddle!" as indicating, perhaps, the dimly distant introduction of animals and objects as talking things in literature? As for the pathetic little comedy of "The Gingerbread Cakes," it was a gem, worthy of the most extravagant praise.

The contrast between Andersen's treatment of animals and that of others was well shown by specimens from Oriental sources (said to have been the well from which Andersen drank) and "The Parlour Cat," "The Snow Man and the Dog," and others.

Comparison between Grimm and Andersen was declared to be impossible, seeing the diametrically opposed standpoints from which they approached the story, and Miss Shedlock declared that if the mantle of the great Hans had fallen upon any one, it was on Mrs. Gatty.

The absence of cynicism in Andersen and his gentle treatment of his critics, his power of seeing both sides of a question, his sympathy with the poor artist against the rich, fat Philistine, and his evident belief that those sunk in sordid cares miss all that is real in life, were all touched on and illustrated; and after showing how Andersen is essentially the children's poet, Miss Shedlock finished off what was a deliciously artistic lecture, alight with humour, insight, and love for the subject, by telling three stories. They were "The Student and the Goblin"—a study of the conflict between the real and the ideal; "The White Hen; or, The Scandal in the Poultry-Yard"—a humorous satire on the spread of tittle-tattle; and "Jack the Dullard"—a boys' story.

It is difficult to say which was the best—all were admirable—and it is perhaps personal taste which makes me incline to the "Scandal." In it Miss Shedlock excelled herself as a *diseuse*. It was a masterpiece of delicate humour, and it is difficult to imagine or recall any one who could tell it as Miss Shedlock did. Thunderous applause greeted the close of the stories—applause that was spontaneous and real—and to it Miss Shedlock replied with one of those swift, graceful compliments to the inspiration an audience can exert on a speaker which fairly clinched the impression her lecture and stories had created. Hans Christian Andersen had been celebrated as he deserved, and by the admirable artist who alone seems capable of doing justice to his work.

THE CHILDREN'S CHARTER.

MESSRS. NELSON have just issued a sixpenny booklet with the above title, containing a lucid sketch of the scope and main provisions of the Children Act, void of legal terminological exactitudes, together with suggestions for social workers throughout the kingdom. As the latter term now includes all teachers, we feel that our readers will be grateful to us for drawing their attention to this exceedingly useful publication. It contains a foreword by the Right Hon. Herbert Samuel of the Home Office, who, to put the matter delicately, may be said to know more about the Children Act than all our legislators, elected and otherwise. The actual editorial work has been undertaken by Mrs. Inglis, whose summary of the Act is as clear as her comments are, on the whole, wise, helpful, and suggestive. The pamphlet is provided with a business-like index, and will be found by all our readers much more practically useful than an official copy of the Act.

The Victories of Peace.

WE have just received the first Part of a serial issue which is to be published by Messrs. Nelson, and which bears the title, *Engineering Wonders of the World*. After careful examination of the plan of the work and of the contents of the Part now issued, we have come to the conclusion that Messrs. Nelson's new venture has educational qualities of the first order. Each reader of *The Practical Teacher* whose consistent aim is to connect the school work with the life of the everyday world will find in its pages innumerable suggestions and abundant material for lessons of absorbing interest and of real practical value.

The editor of the new serial is Mr. Archibald Williams, who is well known as the writer of books on engineering and modern industries which are widely appreciated by young people. Two of his books, which bear the speaking titles, *How it Works* and *How it is Made*, are already well known to budding engineers and others endowed with a healthy curiosity. He now ventures to answer similar questions for children of a larger growth; and judging from the Part before us, he has succeeded in meeting at once the needs of the professional engineer, the ordinary intelligent man, and the boy or girl endowed with a mind of the inquiring order.

The contributors to *Engineering Wonders* include men of the highest rank in the profession upon which, according to Mr. Wells, our future depends. Among these are Mr. John J. Webster, M.I.C.E., who designed the Great Wheel at Earl's Court, as well as bridges and piers which, if placed end to end, would reach we do not quite know where; Mr. Charles Bright, F.R.S.E., whose name recalls memories of the *Great Eastern* and of the first Atlantic cables, which were engineered by his father, and who is well known as one of the leading experts in the electrical world; Mr. H. Dalrymple Hay, who has driven tubes this way and that beneath the streets and houses of our great metropolis; Mr. William H. Booth, who has sunk wells in all parts of the country, and knows how to make the wilderness blossom as the rose; and Mr. George John Leigh, who knows everything about canals and water-power generally.

In his General Introduction the editor waxes eloquent on what might be called the imaginative or poetic side of engineering. We always thought that it was the schoolmaster who was superciliously regarded by that strange abstraction the "ordinary man," but it seems that the engineer has also met with inadequate recognition. "Several years ago," writes Mr. Williams, "there was staged in London a play which taught the lesson that the man of science, the engineer, the inventor, and the mechanic are classed far too low in the scale of civilised society; that when human beings are overtaken by circumstances which compel them to fight Nature for a bare subsistence, the man who can devise and make things comes inevitably to the front."

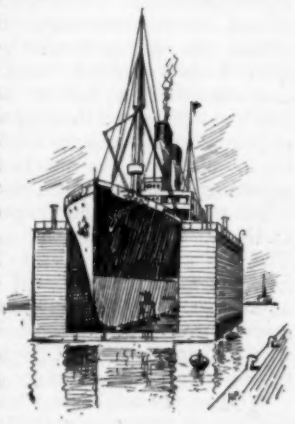
Then Mr. Williams goes on to enumerate a few of the many things we owe to the modern engineer. But his best argument is the subject-matter of the work before us. Taking the world as his province, including the circumambient air as well as the nether regions, he has planned a comprehensive scheme which not only "surveys mankind from China to Peru," but also carries the reader into regions where the natural obstacles overcome by the engineer make the efforts of a Hannibal or a Napoleon pale by comparison. The whole work will be in very truth a prose epic of "man's unconquerable mind," and will give a new interpretation to the Miltonic line:—

"Peace hath her victories no less renowned than war."

The first serial Part reminds us that one of the seven marvels of the ancient world is still a source of wonder even to the modern engineer. In his introductory paper, entitled "Ancient Engineering," the editor speculates suggestively on the Pyramids, and tries once more to solve the problems of Carnac and Stonehenge. He reminds us that King Hezekiah "fortified Jerusalem by leading water into it, bored through the rocks with bronze, and dammed the water into a pool," and tells how the Roman engineers held the Empire which the sword had won.

The next paper is ultra-modern, dealing with the White Pass and Yukon Railway, in the building of which difficulties were surmounted such as Stephenson never dreamt of unless he suffered from nightmare. The picture of the cantilever bridge over Switchback Cañon is worth the price of the Part, and could only be fitly described in a poem, say by W. E. Henley, who proved the poetic possibilities of the motor car, or by Robert Louis Stevenson, who saw the slumbering poetry in the electric light.

Next comes a description of Brunel's great work, the Royal Albert Bridge at Saltash, an instructive type. This is followed by the wonderful story of the salving of H.M.S. *Gladiator* in the spring of last year. The construction of Rotherhithe Tunnel provides descriptive material of a fascinating character, and this concludes the first Part. The illustrations and diagrams are seventy-four in number, including two excellent coloured plates. They are well selected, and in themselves are as interesting and stimulating as the letterpress. The general get-up of the work is such as we have been led to expect from Messrs. Nelson.



Mr. Williams's interesting work comes out at an opportune moment for readers of *The Practical Teacher*. We are now doing penance before the Poor Law Commissioners for lack of the practical in our school curriculum. In *Engineering Wonders of the World* we have the apotheosis of the practical, and each page, as we have already said, is full of everyday help for the wide-awake educator.

Our Art and Handwork Section.

PAINTERS AND PICTURES

BY W. E. SPARKES.

V.—JEAN BASTIEN-LEPAGE. VI.—PAUL DELAROCHE.

BASTIEN-LEPAGE, POET AND PAINTER.

POETRY has been defined as a loving and personal way of feeling and expressing life. The poet must have sympathy enough to picture himself living the life of others and seeing things from their point of view; he must have penetration enough to look through the mere exterior shows of the life about him; imagination enough to make clear to himself and to others the results of his penetration, sharpened by sympathy; and he must have the skill to embody his imagination in fit forms.

Bastien-Lepage, the remarkable painter who, dying young in 1884, has had such lasting influence on French and English art, was a poet by temperament and a painter by profession. It would be a strange thing if such a man's work were not remarkable above all for its intensity of feeling, for a vibrating handling that confesses the sensitive mind, and for a power of instant appeal which is the surest evidence of a poetic nature.

And yet he worked with apparently rough materials. There are no silks and satins, no high-born nobles, no palaces, no spacious parks in his pictures. Instead, there are rough peasants with the marks of labour on their hands and in their eyes, stretches of open, cultivated country under gray skies, rough-patched cottages, and desolate barns.

He felt instinctively that only when a man is in sympathy with his subject is it possible to accomplish his best. "One should paint what one loves and what one knows," he said to a friend. "I come from a village in Lorraine; I shall paint the peasants and the landscapes of my country as they exist. I shall make a Joan of Arc, a true Joan of Arc, who shall be of our corner of the earth, and not merely the Joan of Arc of my studio."

Born in Damvillers in Lorraine, an old town whose ancient ramparts had become walks, and fosses fruit-gardens, he went to Paris to learn painting. But the surroundings depressed him. He could not get into touch with Parisian views of art and the manufacture of pictures by formula. He thought it a mistake to make a student take a second-hand interest in Michael Angelo or Rembrandt. Rather than that, he should study humanity about him, feel their joys, sorrows, passions, and sins, and then, if some fine morning, after reading the story of the prodigal son, it should come into his heart to paint the scene, he would have an immediate, and keen, mental picture upon which to work, though he should, even then, take for his model some living neighbour.

Had Bastien-Lepage painted Madonnas, he would have selected for his type, not some beautiful abstraction, some perfect face and form, but a peasant girl in peasant dress, with a background of Lorraine pasture-land.

He was delighted with the old fourteenth-century French painters because they threw so much feeling into their lightest labour, achieving expression by the intensity of their drawing; he loved them because they associated the little things of Nature with the great interests, faiths, and beliefs of humanity, "sowing with simple wild-flowers the fields trodden by saints and martyrs, and finding room in their naïve pictures for familiar animals—in short, approaching everything from the side of humanity."

This was reality in art. In the boulevards or on the bridges in Paris his mind was continually reverting to his homeland; he saw nothing of Parisian life, but images of peasants constantly arose to call him back to Lorraine. It was at length to his native town that he returned to paint his finest pictures, his eyes constantly filled with the scenes he wished to transfer to his canvas. He painted portraits which, you may be sure, were without embellishments or tawdry display. Some clients might call them uncompromisingly true to life, but his brother artists recognised the originality, the genius of the painter. His peculiar standpoint in art did not, however, please the authorities; and though his brilliant craftsmanship was the wonder and admiration of his fellow-students, who all looked forward with confidence to his taking the coveted prize, the Prix de Rome, the academicians thought that such originality and such departures from academic traditions must not be encouraged, and he was awarded the second prize only. But each day the authorities had to send round their commissionaire to gather up the wreaths and flowers placed before Bastien-Lepage's painting—tributes from his fellow-students, and protests, at the same time, against official woodenness.

There was nothing merely pretty or sugary in the artist's work, and at a time when there was a tendency to return to the "eclectic" school—the school that attempted to abstract all beautiful forms from a multitude of things and to combine these in some new and perfect creation—of course such independent ruggedness must be frowned upon. There were his portraits, for instance. No graceful pose, no elegance, but instead, grim reality, breathing life, and striking character.

"I am proud of my portraits," said he, "for I think one should treat everything, even a tree, as a portrait. As no two things are perfectly similar, talent consists in selection and in giving to each its particular note. There is my whole theory!"

Terms and definitions in French art have a wide and embracing significance. Bastien-Lepage is in France counted among the pre-Raphaelites, and yet in practice he differed largely from Holman Hunt, Rossetti, and the early Millais. But in his outlook, if not entirely in his practice, he is to be counted among the pre-Raphaelites. For though in their pictures the English brotherhood lost all sense of atmosphere (which can never be said of Bastien-Lepage), they and he had everything else in common. He had genuine ideas to

express; he studied Nature with intensity, so that he might express those ideas fitly; he sympathised with all that was heartful, and not merely clever, in all previous art; he produced thoroughly good work.*

True, some even of his admirers thought he carried minute care for flowers and leaves too far. Like his beloved fourteenth-century painters, he neglected nothing, as you may see by referring to the present picture, where the leaves and fruit in the trees, and the weeds and wild flowers, are painted one by one, but yet all in their proper planes as determined by the atmosphere.

His outlook in art is definite. With a poet's instinct, he went for his subjects to persons and scenes he knew well and understood in their essence; he felt deeply, and expressed with all the ardour and intensity of a strongly emotional nature; he neglected no detail that could add point to, or completely round, the creatures of his imagination.

It remains only to say that, in addition to his few portraits, he painted only the peasants of Lorraine. These are generally resting from, or looking forward to, their laborious work. Like Millet, he understood their lot; but unlike Millet, he had not lived their hard life, and so far failed to express that deeper poetry born of suffering with which Millet's pictures are instinct.

Around Bastien-Lepage's peasants there is rather an atmosphere of mystery, a wistfulness that shows in the

JOAN OF ARC.
(From the painting by Bastien-Lepage.)

* *Practical Teacher* for April, p. 516. (William Rossetti on Pre-Raphaelites and their Ideals.)

eyes, a dreaminess projected from the personality of the poet-painter.

"JOAN OF ARC HEARING THE VOICES."

Unfortunately the print does less than ordinary justice to the original painting. Some portions, and those very important, do not appear. But even in its mutilated state, owing to the deficiencies of photographic process, there is ample that is characteristic of the painter.

The painting shows Joan of Arc in her father's farm at Domrémy in Lorraine. Seated in the shadow of the apple-trees, she turns a spinning-wheel gently while musing on the evil days that have fallen on France.

Suddenly she hears heavenly voices. Rising rapidly, she overturns her wheel, with trembling limbs advances, and as the vision of angels and saints shows itself to her eyes, she stands entranced, leaning against a tree and extending her arm. Her eyes dilated with the sight, she stands immovable, fixed in ecstasy. She sees nothing of the garden about her, profoundly absorbed as she is in the glorious yet awful sight, and moved by the message to rescue her distracted country.

In the painting, in the plane between Joan and the cottage, are three figures, St. Michael in shining armour, St. Marguerite, and St. Catherine—the warrior-angel and the suffering saints, the one urging her to contest, the others promising her the victory that had given them a place among the saints.

Much difference of opinion has been expressed as to the fitness of introducing these angels. On the one hand, the poet has a right to his visions, and if he chooses to make them take tangible forms, that is his business; on the other hand, those who argue from Bastien-Lepage's own standpoint, that art should deal with the real and not the fanciful, assert that the absence of the vision in the painting would only give point to the Maid's ecstasy, leaving it free for each of us to supply the details.

The artist's position is clear. In the garden at Domrémy nothing was more real to Joan than these heavenly visitors; and he, seeing, as it were, eye to eye with her, must give reality to these impalpable things.

What is more important is to consider this new Joan of Arc in art. Her image in paint, marble, and bronze was common enough before this artist's day, but how different in treatment! A stately amazon, armoured *cap-à-pie*, fit companion for princely knight-errants, romantic, noble, and valiant. But to Bastien-Lepage, pushing all this gently to one side, she was merely, in face and form, one of the peasant girls he had seen from his childhood working in the fields; in mind, a religious mystic with a mind sensitive to emotion.

Asked how he came to paint such an unusual view of the Maid, he replied that to him Joan of Arc was a Lorraine peasant girl, pious, naïve, and dreaming. Whence, then, her visions? From kneeling and dreaming before the altar, with its gilt statues illuminated by candles. The artist's first notion was to paint her kneeling before the altar, but he determined to show her as accompanied always by visions and mysterious voices.

THE LITTLE PRINCES IN THE TOWER.
(From the picture by Paul Delaroche.)

She has the true "Meusien" type: high cheek bones; wide, large eyes, "through whose long lids filters a look somewhat fierce" (as a French writer describes the people); jaw-bones, rounded and prominent; chin, square, indicating a hard-working and obstinate race; half-opened lips; forehead, low, but intelligent.

Such is the type, touched here with spirituality. She stands in her gray *casaque*, lightly laced, and a dark-red dress falling in great straight folds. In a golden mist behind her are St. Michael holding a sword, and with his two heavenly and benign companions. At the end of the thickly-grown garden, glistening in the bright air, stands the house with its square-leaded panes of glass, and white wall shining below a dark-red roof. But there is surely no need of painted visions in order to understand what is, after all, the chief centre of the picture—the entranced eyes of the peasant girl. She may be a true peasant in dress, in her labour-roughened hands, but she is a most uncommon peasant in mind and religious enthusiasm—a fit instrument to rouse enthusiasm in others.

And Bastien-Lepage was a true poet in his power to realise this feeling and to body it forth with such eloquent painting.

PAUL DELAROCHE, ECLECTIC PAINTER.

At the opposite pole to Bastien-Lepage stands Paul Delaroche. The latter was born fifty years before the former. He had seen the revolution that came about in French art in 1830, but he still retained marks of the old classical, eclectic school, though he was by no means unaffected by the movement.

No more popular painter lived at the time either in France or England. In both countries his pictures were engraved and were sold by the thousand; he was equally at home in painting stirring scenes from the times of Louis the Fourteenth or from English history. Add to this his faculty for selecting affecting moments, his skill in drawing, his somewhat theatrical treatment as well as his regard for gorgeous dress and handsome surroundings, his horror of the lowly-born and sordid, and you can understand why his engravings sold so well.

He was a quiet, isolated man with a strange affection for death scenes—especially for incidents connected with violent death. A few of the titles of his pictures may be given: "The Execution of Mary Queen of Scots," "Strafford on his Way to Execution," "Murder of the Duke of Guise," "The Princes in the Tower."

Here were opportunities for intense emotion. What would they have become in the hands of Watts or Bastien-Lepage? But it must be confessed that Delaroche was not a man cast in such a mould. He had no creative power, little invention, less inspiration. Of course his pictures would be more popular than Bastien-Lepage's: they are all on the surface, and are strictly according to custom.

But this apart, all must admire his fine drawing, his power of composition, his skill in painting material (especially the finer stuffs—silks, velvets, lace), his absence of trickery and freedom from sentiment. He is the highly-accomplished artist, armed at all points, deeply versed in all the *technique* of his art, with a power to suggest beyond what is revealed in his searching drawing. And yet he seems to fall short of that poetry—which, after all, is not a common gift among artists—that strong feeling which shines through mere craftsmanship.

Paul Delaroche belonged to the school called "eclectic." The hands he draws are always beautiful and his figures graceful; for the principle upon which his school works is to see the ideal in the commonplace, and, by abstracting the several separate excellences to be found in individuals, to create a new and perfect form from these elements. There must be no marks of labour or disease. It was the position taken up by Raphael's followers; it continues to-day in most countries; it produces works which, if without imagination, are graceful and pleasant company. Such pictures are always decorative in feeling; and one understands why Delaroche was selected to paint a great fresco in the School of Fine Arts where other greater painters were ignored.

"The Princes in the Tower."

Delaroche had the dramatic instinct. Whatever his picture, he rivets the attention immediately upon the moment; however crowded the scene, his compositions are arranged to draw the eye unfailingly to the chief person. Where, as in the present picture, there is no involved scene the difficulty is not so great, but for this very reason it is less easy to give that dramatic turn which he invariably made the central feature in his pictures. Bastien-Lepage would have shown the tragedy by concentrating terror in the eyes; Ford Madox Brown would have scattered symbols of death about the room; Delaroche accomplishes his object by a light shining under the door.

The princes are reading on that fatal night, when steps are heard approaching and the light from torches arrests their attention. The composition is so arranged as to draw the eye immediately to this circumstance; for you will notice that a line drawn over the heads of the boys, and continued by the curve of the bed-clothes, leads at once to the crack under the door; while, as if further to emphasise this, the dog turns to the door.

This slight but dramatic incident is like the knocking at the door in *Macbeth*, so terrifying to the guilty murderer that Hazlitt looks upon this as the most striking moment in the play. Certainly without this suggestion of the coming tragedy the picture would lose much in dramatic force; it might be considered a portrait group, since there is little in the attitudes or in the faces to suggest the moment. Without that the picture would undoubtedly lose point.

Again, see with what skill the artist expresses the excitement and yet keeps it within bounds. In all his pictures of this kind there are *static* points to keep the action steady. In "The Execution of Lady Jane Grey" the headsman stands impassive among the weeping women; in "The Murder of the Duke of Guise" the group of excited murderers is separated by a long space from the silent dead; in "The Duke of Strafford on the Way to Execution" one stern soldier alone is unaffected by the incident of Archbishop Laud stretching out his hands between his prison bars to give his valediction to the condemned.

This is very striking and effective. In the present picture, the dog is alert; the prince with the book turns his head doubtfully, as though he caught a sound on the stairs: but he sees no light; the other prince is so far absorbed in his thoughts that he has noticed nothing. There is thus a clever suggestion of increasing fear, much more powerful in effect than if the group were shown in sudden and wild commotion; for contrast is more effective than violence. This same

gradation in movement is an ancient and poetical device. It appears even in the great sculpture of the Parthenon, built in Athens in the fifth century B.C., the birth of Minerva being there shown as strongly exciting to the gods and demigods in the immediate neighbourhood of the act, while those farther removed are only slightly roused by the rumour, and those at the extreme ends are unaffected.

For Delaroche was largely classical, and especially Greek, in his art. Those ancient people selected the most exquisite human forms for their sculpture: they tolerated nothing mean and sordid in appearance; beauty was a *cultus* quite apart from the subjects portrayed in their marvellous work.

But Delaroche had added the picturesque to this eclectic outlook. He loved carved furniture, rich dresses, handsome surroundings, and he loved these arranged picturesquely. In the picture, the white bedclothes act as a foil to the black dresses; the long, green curtains relieve the heavy monotony.

It may be objected that this is little like a prison cell. Delaroche and his school would reply that from their point of view realism may become repulsive; it is the office of a picture to be a decoration in the first place, and to this end, even in the most unpleasant scenes, to keep unpleasant details at a distance, to "stage" your tragedies to please the eye.

There is much to be said on both sides; but it may be safely said that in all Delaroche's paintings there is no figure so poetic in treatment as Bastien-Lepage's "Joan of Arc"—which is to say, in other words, that the one artist was a great decorator, with a sincere and stately art which he wrought with consummate skill but without enthusiasm; the other had a sensitive, emotional, and poetic nature which reveals itself in the lightest word.

DRAWING LESSONS UNDER DIFFICULTIES.

BY AGNES E. FARMAN, LEICESTER.

THE success of a drawing lesson depends largely on a well-arranged room; poor work is often the result of badly-placed models. Where the classes are small and the desks movable, the pupils can be arranged round a group or object; but in some schools drawing has to be taught under the same conditions as other lessons, with the children sitting in rows. Even under these circumstances it is quite possible for the teacher with a little forethought to arrange for all the children to draw from the actual things, and not resort to the uninteresting method of a copy on the board. There should always be a sufficient number of objects. One held up at intervals and talked about will help out a memory exercise, but for a lesson on observation and careful drawing of facts the things must be visible the whole time. If the objects be large, one, two, or three, according to the size of the class, will be enough; but if small, some method must be found of arranging a sufficient number for the whole class to have a satisfactory view.

The possibilities of a room will soon be realised, and the following suggestions for coping with the difficulties of arrangement have been tried and found useful; doubtless many more will occur to teachers who are handicapped by insufficient space or ill-arranged rooms. In model drawing the children should not, as a rule, draw things placed on their own desks; they are so close to them that a suitable view is rarely obtained. If the desks are not all occupied, one here and there may be left vacant and used as a model stand for the back rows of children. Again, boards may be placed from desk to desk across alternate gangways (Fig. 1). A contrivance in the shape of two small drawing-boards fastened to an upright bar of wood, which serves as a leg, will hold light articles, and can be placed where convenient between the rows of desks (Fig. 2). A board may be laid on a pile of books or on a wastepaper basket placed on a chair, or over the backs of two chairs, to bring it to the required level.

A swing blackboard can be fixed in a horizontal position and used as a stand for large models (Fig. 3). Things intended for exercises above the eye-level can be placed on cupboards, window-sills, or on a chair standing on desks or a table, in order that they may be seen by children in different parts of the room. Light things can be hung from a rod projecting from the top of a cupboard, and kept in place by anything sufficiently heavy (Fig. 4), or they may be hung from a string or wire fixed across the room from wall to wall. Ten or twelve feet of wire may also be attached to iron hooks fixed into the picture moulding. These should project about eighteen inches. The wire does not twist as string is liable to do, and can be coiled up so as to

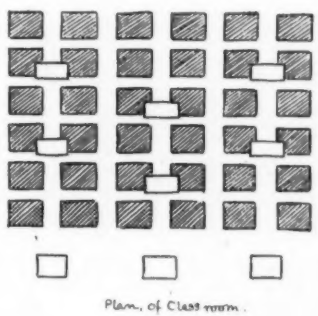


FIG. 1.

FIG. 2.

adjust the models at any height. Hats may be lodged on umbrellas or sticks fixed in the ink-holes for simple side views (Fig. 5), or hung on the top of an easel or on the end of a screen for more difficult positions. The standards for gas or electric light may also occasionally serve to hang things on (Fig. 6).

A loose board slung on to an easel by strong string, with the ordinary blackboard as support, will hold objects of fair weight; and where the top bar of an easel does not allow of this, two strong nails in the top edge of the blackboard will serve (Fig. 7).

Things which are flat or nearly so can be hung up or

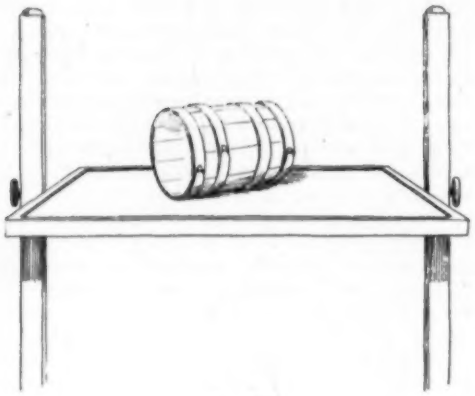


Fig. 3.

Fig. 4.

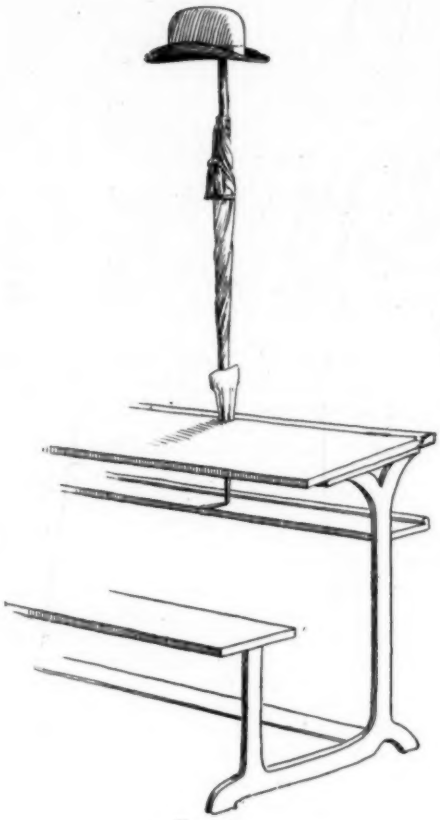


Fig. 5.

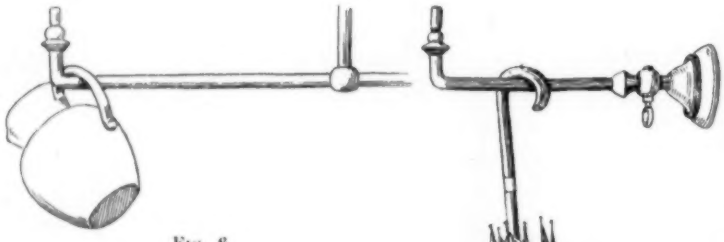


Fig. 6.

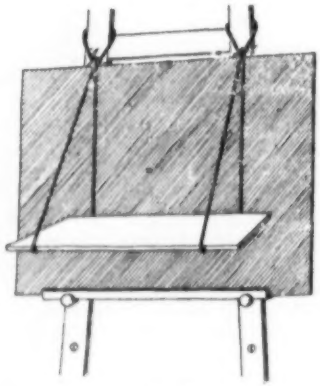


Fig. 7.

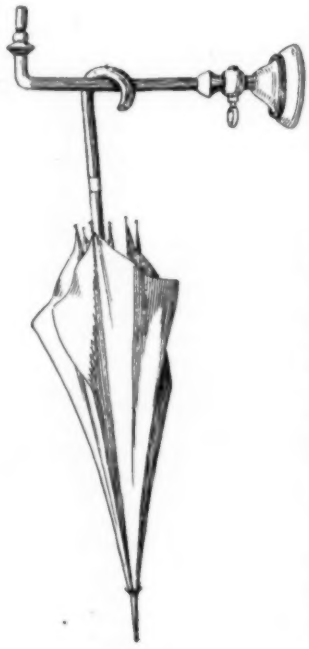


Fig. 6.

pinned on the blackboards, screens, or walls; in the case of rounded fruits, such as oranges or apples, if there is nothing handy to serve as a stand from which they are visible, a skewer or knitting-needle can be poked through them and the string attached to this (Fig. 8).

In fixing up things in this way it is a good plan to place behind them a piece of paper similar in colour and size, or in relative proportion, to the piece on which the drawing is to be made. This paper will serve also as a guide to the position of the drawing on the sheet. In drawing leaves, leaf sprays, and flowers the children should not be allowed to hold them in their hands; the warmth of the hand makes them droop quickly, and it is, besides, impossible to keep the specimens in one position. Large, nearly flat leaves, such as chestnut, may be pinned on boards and screens, with a paper background as suggested above. Smaller ones may be laid on the desk beside the pupils if a simple back or front view is required, but for a spray, in which the leaves spring from all round the stalk, this plan is obviously unsuitable. Large, empty reels can be cut down and made

to fit into the holes for the ink-wells, and the stems of the spray fixed into the holes in the reels (Fig. 9).

Medicine bottles are useful for flowers or sprays that fade quickly, and a piece of twisted wire will help to support those with long stalks (Fig. 10).

If the spray will live long enough out of water, this piece of wire may be held upright in a lump of plasticine or clay, or fixed into a block of wood.

A spray can sometimes be held quite easily between the leaves of a book (Fig. 11), and a piece of paper laid on a book standing on its end will make a horizontal surface at a suitable level on which to place a leaf or branch for exercises in foreshortening (Fig. 12). A piece of cardboard with elastic passed through it and used as a loop, through which one end of a spray may be passed, is a useful contrivance for holding the latter in position (Fig. 13).

When the drawing has to be made from part of a growing plant, it is best to isolate the part which is to be drawn by means of a sheet of paper (Fig. 14).

Unfortunately, comparatively few classes are held under ideal conditions, and it is hoped that these suggestions may be of some practical use to the teacher hampered by difficulties of arrangement.

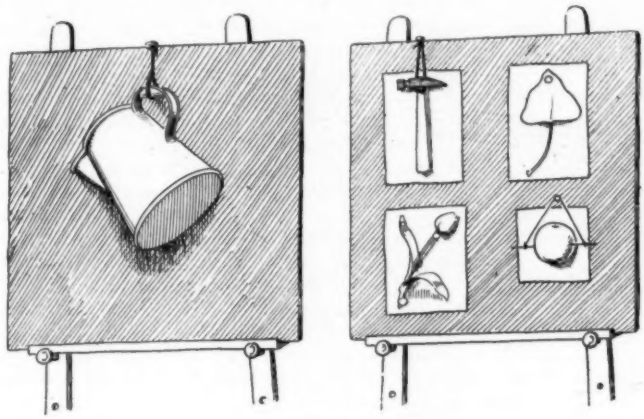


FIG. 8.

FIG. 14.

FIG. 9.

FIG. 10.

FIG. 11.

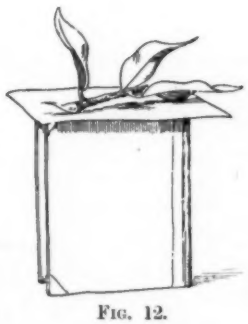


FIG. 12.

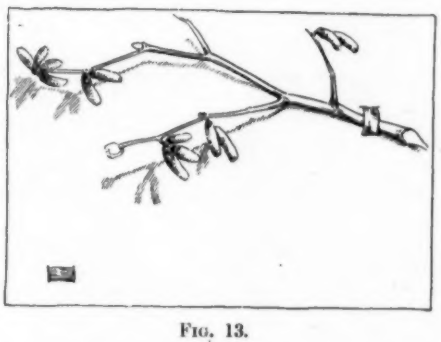


FIG. 13.

EDITORIAL NOTES.

SUMMER COURSES.

EASTER is past, and one's thoughts begin to turn towards the summer vacation. Those who, from inclination or necessity, combine work with pleasure have a wide choice in the selection of holiday courses, at home and abroad, as follows :—

NÄÄS.—Woodwork—June 8 to June 19; July 27 to September 6.

LEIPSIC.—Woodwork, metalwork, modelling, etc.—July and August.

Full particulars of these courses can be had from Mr. J. Cooke, 131 Percy Road, Shepherd's Bush, London, W. Applications for Nääs must be sent before April 30.

SCARBOROUGH.—All educational handwork subjects—July 26 to August 21.

Apply to Mr. J. Spittle, 47 Spring Street, Huddersfield.

BRIGHTON.—Pedagogy, handwork, and nature study—July 26 to August 21.

Apply to Mr. J. H. Naylor, 4 Portland Terrace, Eglinton Hill, Plumstead, S.E.

AMBLESIDE.—Handwork and nature study.

Apply to Mr. J. Phillips, Rothay Holme, Ambleside.

BARRY.—Handwork.

Apply to Mr. A. Sutcliffe, 21 Morlais Street, Roath, Cardiff.

CARNARVON.—Handwork.

Apply to Mr. Thomas, Education Offices, Carnarvon.

* * * * * *

Special attention is directed to two articles in the current issue. Mr. W. H. Elgar commences a series of papers showing the use of drawing in connection with the history lesson. Drawing is more and more being utilised in connection with other school lessons, to the obvious advantage of both. If pupils go into museums and make sketches such as Mr. Elgar suggests, a host of ideas which would otherwise be lost will centre round such drawings, and the information given through them will be retained far longer than if the memory alone is depended upon. The illustrations also furnish good suggestions for the "Honours Page."

The other important article is the report of the Art Masters Association, which comes at a most opportune time. A great deal of utter nonsense is being talked in reference to the art education of children. In certain quarters it is assumed that no teaching is necessary. One has but to put the object before children, and they represent it faithfully as a natural gift. We can only say that, after a quarter of a century's intimate acquaintance with all grades of young and adult pupils, we have never been lucky enough to meet with these geniuses in bulk. Rare specimens we have found, but the majority learn to draw just as they learn any other subject—by skilful teaching, backed up with hard work.

We hope there is not a single reader of this magazine who hankers after the uneducational method mentioned by Mr. Hastwell, where, though natural flowers were to be had in abundance, yet the teacher built up a drawing on the blackboard, line by line, without apparently much reference to the natural form, and never even gave the children a chance to see for themselves.

Undoubtedly we want children to draw what they see, and not what we see for them, but it must be recognised that they have to be taught how to see. They want help, guidance, support, and leading from the teacher. It is against all Nature, human or otherwise, to be allowed to run wild if any perfection is to be attained.

All the practical teachers, like Mr. Vinall and Mr. Mumford, take this view; and probably if the advocates of what may be called the "go-as-you-please" method were called upon to teach in an ordinary school for twelve months, they too would become converts.

Does not every teacher wish earnestly from the bottom of his heart that the children could make satisfactory drawings entirely on their own initiative, and that his "interference" to put things right was not necessary? How much lighter and more enjoyable would be his labours!

Mr. Lewis F. Day, always practical, put a world of level-headed common sense into his short speech. He confessed himself no teacher, but at least he knows what "drawing" is, and probably knows the only road to success lies through well-directed guidance and continuous effort on the part of teacher and pupil.

HONOURS PAGE.

THE following scholars have gained "Honours" this month, and will each receive a box of colours shortly :—

1. Adam Marshall (9), Tillmouth Council School, Northumberland.
2. Harold Dealtry (10), Crescent Road School, Middlesboro'.
3. Isaac Wright (13), Hurley Council School.
4. Jenny Fullarton (?), Newnham House School, Ayr.
5. W. Jones (13), Mantle Road Council School, Leicester.

There are several gratifying features in the drawings recently sent, from which the above are the first selection. Obviously more care is being taken in the "drawing." No. 1, for example, is quite a remarkable study for so young a scholar. Several other excellent drawings were sent from the same school. The subjects chosen are not only interesting in themselves, but form good material for study. The use of colour or simple pencil shading adds much to the realism of the representation. A selection such as those shown here should give intending competitors a good idea of what to aim for.

The drawings can be sent at any time, addressed to Mr. J. Vaughan, 7 Campside Crescent, Langside, Glasgow.

N.B.—They should be packed flat, and *each drawing should have the scholar's name, age, and full school address written on the back.* We cannot undertake to return drawings sent for this competition.

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HONOURS PAGE.

THE HISTORY LESSON AND DRAWING.

BY W. H. ELGAR.

I.—PREHISTORIC PERIOD.

IT is superfluous at this time of day to draw attention to the advantages of using drawing as an aid to other studies, especially to the modern educationist; but at the same time these advantages have not been so fully realised as they might have been.

With the help of the pencil history may be made a very living thing to children, and not a mere skeleton of comparatively meaningless facts. How our predecessors lived and worked and fought, their tools, weapons, houses, and clothes, are matters of absorbing interest, and help to clothe the dry bones with flesh, and possibly to live in the minds of young students.

Professor Freeman, in his lectures on the "Methods of Historical Study," fully recognised these advantages; but it is to be feared in too many instances this graphic study has degenerated into mere copying of prints and drawings, which practice gives no proof of the realisation of the objects represented, and certainly does not teach drawing. Probably some of the sketches given in answer to Question 3, Section I., of the paper on the Teaching of Drawing (Certificate Examination, 1908) are reproductions of some illustrations in books. Little do some of the candidates think that it would not be a difficult matter for an expert to distinguish a great many of them from those which are the results of direct study.

There, of course, is the danger of allowing the study of historical objects to usurp the place of the regular drawing lesson. The Board of Education is fully alive to the effects of too much nature drawing, as is shown by the first question, Section III. of the examination mentioned above.

It seems that the regular drawing lesson should be the time for the careful study of minute differences in the appearances of objects, due to the position of the spectator, the surroundings and texture of the object, and their best possible representation; while in such work as we are now considering the most characteristic view, or views, must be chosen, and almost any means used to secure the most perfect record in a minimum of time. Thus, this work might be considered as a beginning of the practical application of drawing to other objects than that of manual training.

One more general consideration and these preliminary remarks must close. It is essential that the interest in the objects must be intelligent. Many historical readers contain illustrations of tools, weapons, costumes, etc., to which no reference is made in the text. For this reason it will be necessary to describe the historical periods somewhat in detail, and include a number of explanatory sketches, which are not to be exactly considered as models for children's work, but rather as educative graphic notes for the benefit of the reader. Strange as it may seem, many of our present-day forms of tools are comparatively little different from those of prehistoric times, and the weapons then used were the prototypes of the principal weapons of the Middle Ages. For this reason, and for others that will appear as we proceed, this short introductory paper has been taken up with the so-called Prehistoric Period.

The works of man are as much history as documentary evidence. Far too few of us can read anything but written history. Man's first struggles with nature are very permanently recorded in durable stone. These records, principally in the form of tools and weapons, are very widely distributed, often near the surface of the ground, often unexpectedly turned up, and are as often unnoticed because of ignorance. Probably many boys have been present when worked flints were turned up by the plough, or have moved them when playing by a stream, without noticing them. This seems a pity, for these are almost the only historical relics that they ever could hope to find or possess. Most museums contain examples of these periods, so that they are easily accessible for study.

The Prehistoric Age is generally divided into the Stone and Bronze Ages, the remains of the respective periods being principally of those materials. Archæologists subdivide the Stone Age into three, corresponding to the kind of work that is found on the stones, as hacking, chipping, and flaking. "Eoliths are hacked, paleoliths are chipped, and neoliths are flaked," says Dr. Blackmore. All these periods overlapped, and even in the Bronze Age stone implements were made, and highly finished and polished. The polished stone axes were such formidable weapons that they were retained long after the close of the prehistoric periods, and it is almost certain that the Saxons used them.

As these flint relics have more meaning to children when seen mounted, our first four illustrations are from specimens mounted at Brandon in Essex, where the flint industry flourishes to this day, and from whence the flints used by the army in South Africa in the recent Boer War were obtained. These flints, as is well known, were supplied for the purpose of striking lights when matches were spoilt or unobtainable. A flint axe-head is secured to the fork of a tree branch, broken so as to resemble more closely the ancient implement (Fig. 1, Plate I.). By splitting the end of a suitable piece of wood, a receptacle is made for the spear-head, which is secured, as is the axe-head, by strips of raw hide. The arrow-head is fastened to its shaft in a similar way, while a somewhat broader piece of hide envelops the kidney-shaped hammer-head, and secures it to its haft.

Figs. 5, 6, and 7 show varieties of arrow-heads, the first having projections to assist in securing it to its shaft, and the last is barbed. Two spear-heads are numbered 8 and 9, the latter being chipped and the former flaked, as is shown by its smoothness. A long pick is sketched as Fig. 10. This was found scarcely a hundred yards from the writer's home. One of the latest stone implements is numbered 11 and 11*a*. Fig. 12 is a flat, thin, sharp-edged piece of flint, which was used for scraping bark from handles or cleaning the insides of skins. A core—that is, a piece of flint from which flakes have been struck—or punch (Fig. 13) is an unmistakable article, both on account of its slightness and its clean, sharp surface. Very dexterously struck off pieces became knives (Fig. 14) or saws.

It is impossible in such a short article as this to pursue the subject further; those who desire further information could not do better than consult Sir John Evans's great works on the Stone and Bronze Ages. However, it is just as well to remember that many peoples at the present day use stone for similar purposes,

Flint Weapons & Implements.

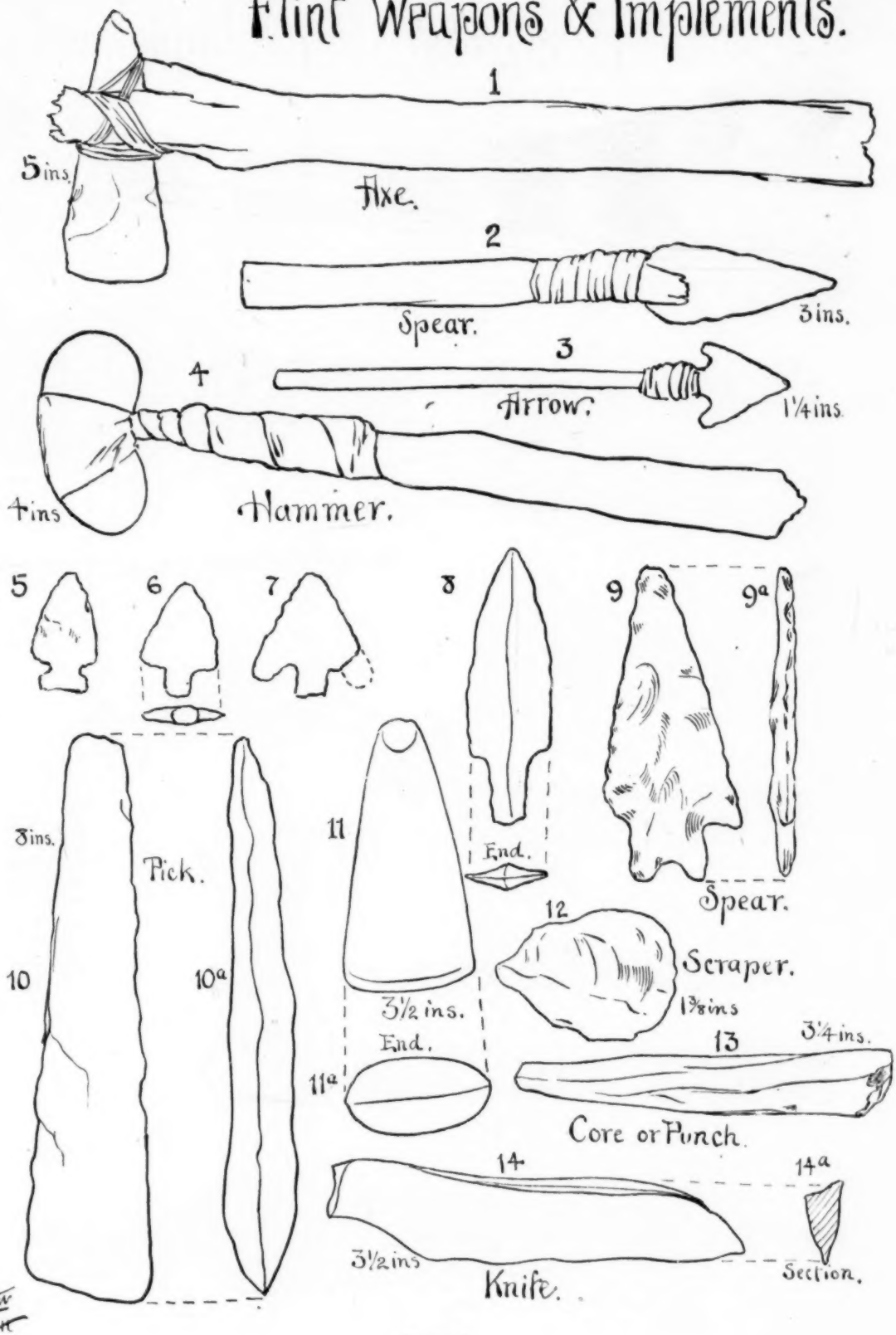


PLATE I.

PLATE II.

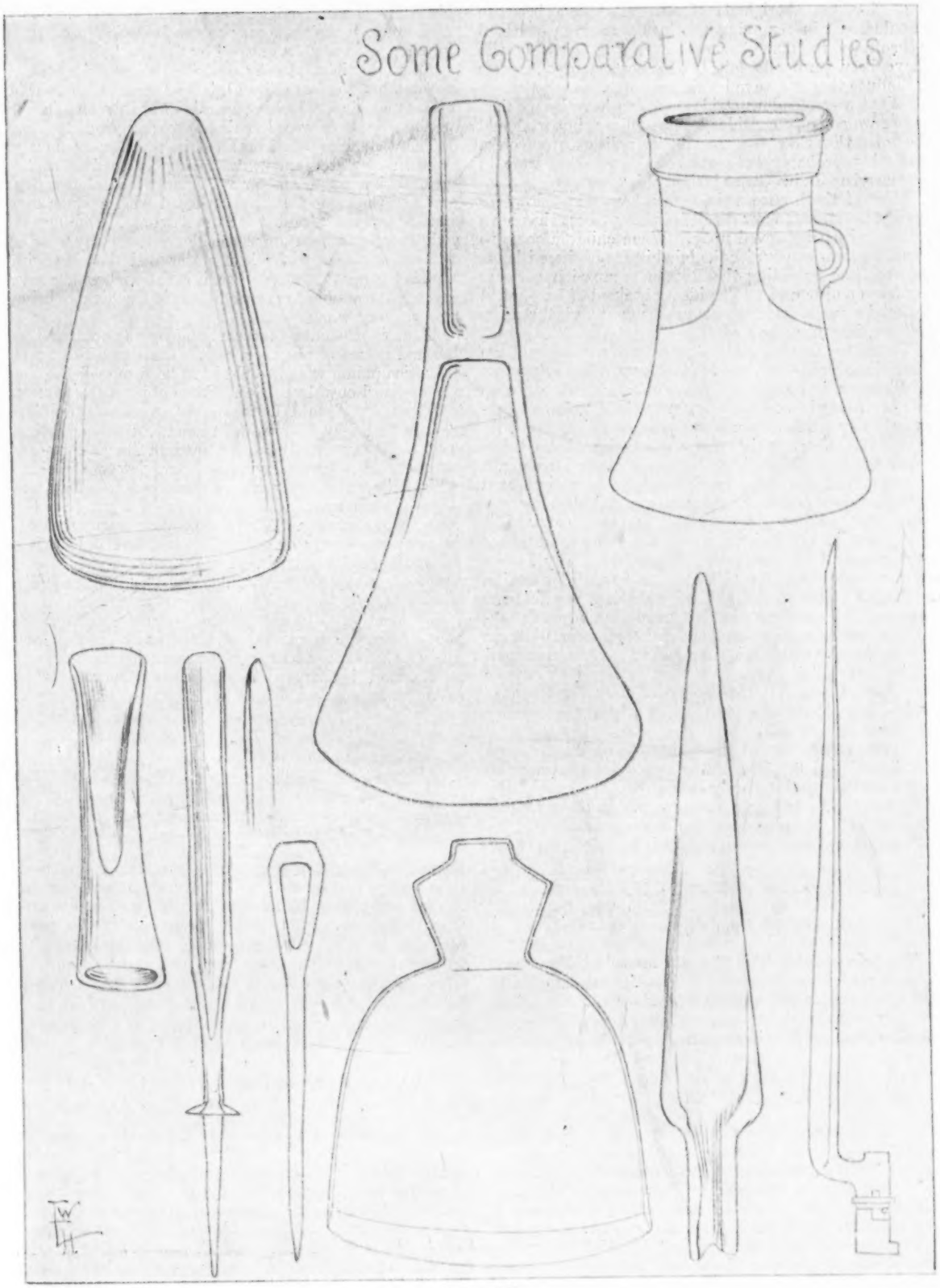


PLATE III.

and that the aboriginals of Australia have been so troublesome in removing the insulators from overland telegraphs to make arrow-heads, that glass bottles have been purposely left at the bottom of the posts to induce them to leave insulators alone.

What a tremendous stride seems to have been taken when we come to consider bronze relics; but it should be noted that they were coeval with polished stone ones, and that probably both methods of working were in vogue when Julius Cæsar visited this country.

Most of the bronze articles that have come down to us were cast, and show details of that process that have scarcely been improved upon. When children come to see this, their respect for the inhabitants of these islands of the time preceding the Roman occupation goes up by leaps and bounds. The ideas obtained of half-naked painted savages from too many of our historical readers get considerably modified.

Complete sets of moulds, copper, etc., for casting have been discovered—one fine set in Harty, a low-lying part of Sheppey, in Kent—and space only prevents sketches of them being included in our illustrations. These somewhat hasty studies include the *palstave* (Figs. 1 and 1*a*, Plate II.), about which many discussions have taken place among archæologists; but there seems little doubt it was a kind of axe, for specimens have been discovered which, taken together, show a gradual development from the polished stone axe. The one illustrated is fairly late in the series, showing the flanged edges for strength, and the connecting ridge, technically known as the stop-ridge. How like the modern girder section is Fig. 1*a*! The second and third sketches are different views of the same *celt*—an instrument which was probably a further outcome of the *palstave*. Fig. 6 shows the method by which it is supposed to have been secured to its haft. Two views of a very modern-looking tool are Figs. 4 and 5. This gouge of very hard bronze differs from those now used principally in the manner of attaching a handle.

A great part of the handle of a bronze sword is sketched as Figs. 7 and 8. One of the rivets for securing the wood packing shows plainly in Fig. 8. The holes probably assisted in fixing the mountings. In order to give an idea of a complete weapon, a simple sketch of an ordinary leaf-shaped bronze sword is included (Fig. 8*a*).

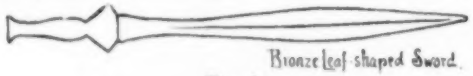


FIG. 8*a*.

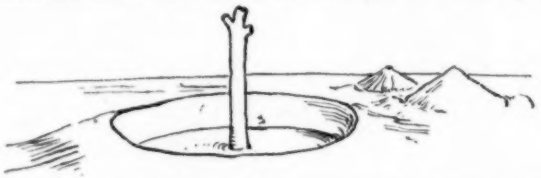
The bronze sickle (Fig. 9) could scarcely be improved upon even now. Note the two stiffening ridges and the gradual increase in width towards the handle. The blade is about nine inches long, and it was probably used much in the same way as the Egyptians worked—for cutting corn when grasped by the hand.

All the articles already described show evidences of casting, but the last (Fig. 10) is a hammered spear-head of a much darker-looking metal—probably late in the period when men were learning to work in iron.

These sketches were outlined in pencil very lightly. A wash of mixed colour, as nearly as possible of the general tint, was then run over, and, when almost dry, some of the same tint, strengthened with a little dark blue or sepia, was added for the shadows. One or two lights were taken out on the sickle, celt, etc., by wetting the exact places with clean water and dabbing with blotting-paper. Most of these, it is believed, would have given little trouble to most children in the higher classes of a primary school.

There is no doubt that studying by the comparative method is one of the very best. The mind is brought to notice points which would have been missed had not the comparison taken place. Some objects are brought together on Plate III. to suggest a simple application of the idea to the work in hand. A polished stone axe, a palstave, a celt, and a modern English axe are compared, the latter having an edge view at the side; while a bronze gouge, with its modern descendant, and a prehistoric spear-head, accompanied by a bayonet, keep them company. All these are very simply treated, in most cases only one side showing, and only a few lines of shading introduced. A little simple, careful work of this character would probably have a very wholesome effect on many schools just at present.

No mention is made in the foregoing remarks of the dwellings and clothes of these early people; but almost the earliest traces of construction now known in England indicate some such arrangement as that sketched in our last little illustration—a circular pit,



having an upright post in the centre, which supported radiating props covered with brushwood and turf or similar materials. Skins must have formed man's earliest protection; but woollen cloth was in use very early in Britain, as is proved by the fastenings of various kinds which have been discovered. Some of these buckles may come in for consideration in future papers.

ON METHODS OF INSTRUCTION IN DRAWING IN ELEMENTARY SCHOOLS.

MR. WALTER CRANE, R.W.S.

A GENERAL meeting of the London Association of Art Masters was held on Saturday, March 20, in the small hall of the Regent Street Polytechnic, under the presidency of Lewis F. Day, Esq., F.S.A.

The subject of discussion was "The Methods of Instruction in Drawing in Elementary Schools."

Walter Crane, Esq., R.W.S., in introducing the subject, said that it was necessary at the onset to have a clear idea of what was meant by drawing in elementary schools. A very small amount of time was allowed to such an important subject. He saw by the school time-tables that only two hours a week were given to it, and he was told that even this time was considered by some to be a liberal allowance.

But it had often surprised him what could be done in this short time. As they all knew, he had been concerned in drawing up a syllabus for the Board of Education some years ago, in which he gave a series of examples illustrating his ideas of the course which should be taken in order to lay a good foundation in drawing, which could afterwards be followed up, if desired, by a course in a school of art. He advocated groups of objects drawn in elevation and in perspective, in ground plan and cross section, in mass and silhouette. This, in his opinion, was the utmost that could be done in elementary schools.

Coming to the actual teaching, there was a class of educationists who advocated leaving the young idea quite alone in the matter of drawing; and certainly he considered that many unaided first efforts were very remarkable. There was something very fascinating in the charming unconsciousness shown in these early efforts to express colour and form. But there came a time when these unconscious abstract images were insufficient to satisfy the child's growing intelligence, and this kind of drawing faded away when subjects like writing and reading were taken up. The child became conscious of an unsatisfactory result in his attempts at drawing, and, becoming dissatisfied with himself, allowed his efforts to lapse. It was at this point that he considered some teaching was necessary—some leading of the young idea, now dimly conscious of the want of correctness.

Drawing should primarily be regarded as an aid to intelligence, and accuracy should be encouraged, though in this matter he would give great discretionary power to the teacher. A child should be *led* by successive efforts from failure to success. In reference to model drawing as generally practised, was the use of geometrical models satisfactory? He thought it was far better to take some real object, and thus interest the child with things he was familiar with and could handle every day. He was decidedly in favour of the movement for bringing the sense of beauty and imagination into the schools. He thought that a good selection of school pictures would tend to react on the children's capacity for drawing and stimulate their imagination. The children must be *interested*, and their imagination *must have material on which to feed.*

There were two main methods of dealing with the teaching of drawing.

1. The *line* with a *firm point*—pen or pencil drawing. This was very valuable, and should proceed from a large scale, as with chalk on a blackboard, to a smaller scale with pen or pencil on paper. He had seen in America some remarkable drawing by children under the instruction of Mr. Liberty Tadd, which showed great facility in line drawing, with both arms and hands. It was a kind of bi-manual training; but he did not know what use they put this to in after-life.

2. There was also *drawing with the flexible point*, or *brush drawing.* This was apt to wander into vague splashes and dots. He considered it was better to make a definite silhouette than to splash about in an indefinite sort of way.

Then there was also memory drawing. In his opinion the memory could be trained to an almost unlimited extent. The great point to be aimed at was to get the child into the habit of observing and recording a thing in his mind. Then the memory sketch would show what had been observed and what omitted.

Mr. Ebenezer Cooke thought that we should ask ourselves the questions, "What is elementary drawing?" and "What are the elements of drawing?" before we could make much progress in the discussion. Drawing in line was reducible to two elements—the straight line, and the arc; and yet, as far as he knew, nothing in Nature could be represented by an arc. It was a strange thing that we had not yet, with all our efforts, discovered the A B C of drawing. We had a gamut in music; we had an alphabet in literature; how are we to find the corresponding alphabet of drawing? He might suggest a search through the works of Mr. Walter Crane, and try to find out the gamut or alphabet underlying his drawings. But, as far as he could see, no single point was ascertained definitely; all was full of vagueness. For all these hundreds and thousands of years drawing had existed, and yet there was no recognised alphabet. In reference to actual teaching and the talk about leaving or not leaving a child alone, his advice was: "First learn what a child is. Learn from the child itself how to teach. Watch it carefully, study its nature, and then take the child along its own line of development."

A young child began with scribble. Allow it to scribble, and then evolve everything else from that starting-point. *Teachers should not do for a child anything that he could do for himself.* It was a great mistake to take away the power of self-activity. He found that the children of rich parents in the West End could not use their hands as well as the poor East End children. They were waited on hand and foot by servants, and not even allowed to dress themselves.

In reference to memory drawing, they should remember that they were dealing with the whole knowledge of the child. Memory should not be regarded as a separate thing; it cannot be isolated.

He should lay down as three important educational principles:—

1. That drawing should keep in touch with reality.

2. That a child should be *trained to think* before he put a stroke on the paper.

3. That drawing should be the expression of a child's own self.

It was the most difficult thing in the world to express oneself exactly. No man could be said to be educated if he could not express in some form or other what he was thinking about. Drawing was a means of educating a human being. He should learn to observe, to think, and to express himself in consecutive order.

The effort to express is the thing that educates.

You could not, he thought, help a child of four or five years old to see. If a child drew a man with three hands, he should not tell him he was wrong. But he *would tell him to look* again. A child should draw from his *own* knowledge, not from that of the teacher. When the value of drawing as a means of education was fully known, it would not be regarded as a special subject. It would permeate all the subjects of the school curriculum, and every subject thus dealt with would be a great deal better in consequence.

Mr. Vinall, A.R.C.A., thought that it should be taken for granted that a child required help. He must be *trained to see* as well as *trained to do.* The very young child symbolised when he drew. As he grew older he required training in observation, for he could not *see.* He thought the teacher should be an active personality, and not merely a policeman to keep order.

But they must remember that in an elementary school the *class was the unit*, not the individual. The

teacher had to train a great number of children. It was like training an orchestra. There was no time to help each particular child. He advocated the very careful grading of objects to be studied. It was premature to give an umbrella to be drawn by children in Standard II.—an instance which he had met with in one school. It was far better to give a simple whip or other object involving no perspective. But he certainly believed in the wisdom of the teachers demonstrating on the blackboard. With Professor Lanteri he held that "demonstration was the test of a teacher's capacity."

Richard Hatton had said that it was necessary to *give children a lead*; the teacher should give an example of methods. Let the teacher, therefore, be a leader.

Mr. Lewis F. Day remarked that he was not a teacher, but it was evident that the point about leaving children alone or teaching them was a very important one. If a child was to be left alone, what was the use of the teacher? The matter was a very serious one, and should be thoroughly thrashed out. Mr. Cooke would show a child colour, but would not say whether the pupil's attempt to match it was good or bad. No doubt there was a strong reaction against dogmatic teaching, but he thought that it had gone far enough. When should a child be told anything? Not until he asks? He contended that it was the duty of the teacher to help the child to see. In his opinion the only way of success lay in showing the difference between good and bad, and by constantly comparing. Some people were terribly afraid of influencing children. Why, every artist had been influenced by his master! He had attended the meetings of the Conference on Drawing convened by the London County Council, and one speaker had there said that "all suggestion to children was an interference, and that interference was damnable."

As regards any particular system of teaching drawing, if the teacher were a strong one, any system might be employed; if the teacher were weak, no system was of much use.

Those who talked so much of drawing as a means of expression seemed to conceive of expression as pictorial expression only. Drawing in elementary schools was not art, but drawing could and ought to be taught. He thought there was great benefit to be derived from mechanical drawing. Every boy should know how to draw the plan of any simple object.

Mr. Mumford, A.R.C.A., said that his experience was that, when a teacher had to deal with a class of sixty children and the lesson was forty minutes long, the blackboard demonstration was the only method possible. We all had our ideals, but it was not always possible to carry them out. Teachers were now confronted with inspectors having advanced views. There was to be no flat copy at all in use, no technical exercises for ensuring a training in accuracy. Was this the ideal system for primary schools? He thought they should continue to teach clay modelling and design as well as drawing from Nature and memory drawing.

Mr. Hastwell maintained that the most important thing they wanted just now was the study of the child itself. He advocated frequent visits to the infant school and careful study of child nature.

With reference to drawing *versus* art, he considered that when a young child threw his whole soul into a drawing, as he had often seen, *it was art*. He deprecated the continuance of the old bad method of "one line at a time," where the children copied the teacher's drawing instead of putting down their own ideas of what they saw. He recently went into a large infant school where a student-teacher was to give a lesson on the tulip. There was ample preparation made, and a large and brilliant array of flowers decorated the classroom. Of course the children were going to draw these tulips! Not a bit of it. The head-teacher's instructions to the student were that she should draw a line at a time on the blackboard, every scholar draw a similar line, and so on, until the *teacher's* copy was reproduced on every paper. And this was Nature drawing! He agreed that the teacher must aid by suggestion, but he did not think the class could be taken as the unit. He also supported the view that drawing should be systematically combined with nearly every other school subject.

Another speaker, who stated that he was an assistant master and not a special teacher of drawing, gave it as his opinion that visiting teachers of drawing should be kept out of the schools. They thought of their own special subject too exclusively, whereas the class-teacher could easily link it with other subjects. He did so himself with great frequency, especially in the arithmetic lesson. Again, the visiting art teacher did not, and could not, know the children he had to teach. He admitted, however, that half the teachers could not *see* themselves, so he advocated letting the children alone. Let the children try to see first; then it was the function of the teacher to criticise.

Mr. Renard, A.R.C.A., thought that much good had been done by the discussion. As an ex-Council art master he felt at liberty to freely criticise the system of teaching drawing in the London schools. He thought that the well-qualified staff of art masters in the employ of the Council were not utilised to the best advantage. If they were in America, they would be sent round to the schools as art advisers, not as inspectors. In most schools he believed that the teachers were glad to have the help of a specialist, though it was quite true that the latter was sometimes criticised by an ignorant head-teacher. His idea was that there should be a system of ocular education—teaching through the medium of the eye, instead of through the ear only.

Mr. Walter Crane, in summing up the discussion, remarked that there was no necessity for a hard-and-fast system, and admitted that his definition of the primary use of drawing as an aid to intelligence was only one aspect of what could be done in elementary schools by a wise and capable teacher.

Nature and Design. By Herbert R. Weller. (*Charles and Dible.*)

A very good book. The drawings from Nature are very carefully and faithfully done, a point which is so often neglected in books of this kind. The author rightly says that no illustrations, however good, should take the place of direct study from Nature; but a great deal can be learnt by students and scholars through looking at well-executed drawings and noting the style of treatment and method of execution. In this way, as well as in the suggestive application to designs, the book will serve a useful purpose.

NOTES AND SUGGESTIONS ON THE TEACHING OF EXPERIMENTAL SCIENCE, MATHEMATICS, AND DRAWING.

BY C. HAMILTON.

(*Continued from page 533.*)

II.—Sound Principles of Sound Practice.

THE subjects of school instruction are usually classified into knowledge subjects and practical arts. Thus history, geography, science, etc., are knowledge subjects, because they add to the student's stock of ideas, and provide raw material for the process of thinking. Again, speaking, writing, drawing are practical arts, because they involve imitative action.

The separation is not, of course, absolute. The student who adds to his stock of knowledge obtains incidentally more or less practice in the arts of speech, writing, etc.; and, on the other hand, it is impossible to acquire skill in some art without at the same time adding to one's stock of knowledge. But the main distinction is that in the one case the *aim* of the teaching is the acquisition of knowledge, and in the other the *aim* is the acquisition of skill or dexterity.

Consider first the acquisition of knowledge. If any man is asked what he knows and why, it will be found that his knowledge is of two kinds. Some of it he has obtained by experience, and the rest is not so much knowledge as belief. In the case of an intelligent thinking man, it will be found that the knowledge he has obtained at first hand assists him very considerably in accepting other facts or statements which are in harmony with his experience, and in rejecting those which are not. The conclusion to be drawn from this example is that in knowledge teaching the student should acquire such facts as he can at first hand, and that these should be amplified and extended by the teacher.

Further consideration of this example brings out clearly the relation between laboratory teaching or practical work and class instruction. The function of the former is to provide the small nucleus of practical experience which enables information derived from teacher or text-book to be assimilated.

In recent years the pendulum has swung from class teaching and no laboratory work to laboratory work and no class teaching. It is not easy to say which extreme is the worse. Certainly knowledge obtained in the laboratory has a peculiar permanence, owing to the fact that (*a*) the student's attention is more closely chained when he is *actively* engaged in learning, and (*b*) there is correlation of motor effort with sensation. But most of the experiments in the laboratory lead to isolated facts, and isolated facts do not constitute useful knowledge. Knowledge which is of any value in intelligent practice, and which is capable of growth, consists of facts in logical relation. Laboratory note-books frequently contain descriptions of many experiments, but not a word as to why the experiment was undertaken, what conclusion other than a numerical result was drawn ("drawn blank" expresses the case exactly), or what the next step should be.

The truths which are of real value are those broad generalisations which connect and explain a large number of facts. The danger of too much laboratory work and too little class teaching lies in the fact that if conclusions are drawn they rest on an insecure basis. Time will not allow of anything like a complete investigation by each student, but sufficient can be done to enable him to grasp the extension of fact given by the teacher. Thus if the students make experiments on the compressibility of air, and find that P.V. is a constant, they are only logically entitled to state the law as being true for *air* within the *limits* of experiment. If the teacher now carries out a similar experiment with coal-gas the ideas of the students will be considerably widened, especially if he can, with a more elaborate piece of apparatus, extend the limits of pressure and volume; and they will appreciate more fully his statement of the law as a general law for gases over a wide range of pressure. The example may appear pedantic, but it leads to accuracy of thought and expression in marked contrast to the loose pseudo-scientific phraseology so frequently encountered. And without the class lesson the practical exercise might easily be a waste of time.

The relative amount of practical work and class teaching offers considerable scope for the teacher's judgment. The older and more advanced the students, the less practical work they need; the younger and more elementary the students, the greater is the necessity for practical work. Beyond a certain point increase of practical work means slower progress, without an appreciable increase of efficiency of instruction.

There are many experiments which require either too much dexterity to be left to individual students, or so little as to make it a waste of money to duplicate the apparatus and a waste of time to give them to individuals to perform. On the other hand, these experiments may be of the utmost importance in making some point clear or in securing completeness of the knowledge. In such cases a class demonstration is fully justified, provided also that suitable apparatus is used. If the teacher does elect to perform an experiment himself, the apparatus must be simple enough and large enough to enable the students to see as clearly as though they were performing the experiment themselves.

If it be granted that, while the students must learn as much as possible at first hand, the division of practical work between teacher and students is dictated by expediency, the next point for consideration is the arrangement of the knowledge which is to be acquired. Teachers who are familiar with the Herbartian four (or five) step method will not need to be reminded of the meaning of the word section. It is a group of ideas, or a step in knowledge. Each group of ideas or section is to be dealt with before another group is considered, and it may require one or several lessons for the students to assimilate it. Within each section the order of procedure is as follows:—

1. *Preparation or Aim.*—By suitable questions, or, in the case of older students, by review of previous work, or appealing to the daily experiences of the class, the teacher brings into the minds of the class those ideas which are most closely associated with the subject of the section. Having thus set the class thinking about the old, the aim of this, and possibly also the succeeding, lesson is stated. In this connection it is desirable to avoid using an unfamiliar term. Thus, in a lesson on the elasticity of gases, Boyle's law is frequently written on the blackboard at the commencement of the lesson. But Boyle's law is the conclusion,

not the aim, of the class, whatever it may be to the teacher. The term Boyle's law is only a label at the best, and the students have no need of the label until they have acquired the little parcel of knowledge to which it refers.

2. *Presentation.*—At this stage the new knowledge is to be brought before the class. This may be wholly or partially by experiments by the students or teacher, or it may occasionally be given orally by the teacher with the help of the blackboard and an appeal to everyday experiences. In a few cases, with older students, presentation may take another form, in which "the teacher leads the pupil to think out the situation for himself, and by skilful question and answer enables him to travel on the road to new knowledge without the aid either of narration or experiment." * The teacher's function here is to supply material, explain terms, and provide data where necessary, and to allow the students to assimilate the knowledge in their own way.

3. *Abstraction and Comparison.*—In this process the students examine as a whole the new facts they have acquired in parts. The facts are compared with one another and with similar facts acquired previously, classified, and arranged, and then an attempt is made to draw some general conclusion.

4. *Formulation* is the term given to the statement of the conclusion on the examination of the facts as a whole. This statement may take the form of a general law, definition, or formula. Where the conclusion can be stated in the form of an equation the algebraic statement should in the early stages be regarded simply as a "shorthand" representation of the verbal statement.

If the class find a difficulty in stating the conclusion, it will probably be because the presented material has been insufficient. In the process of comparison, accidental or unessential facts and phenomena are rejected, and those which are common to the whole of the presented material are seized upon and isolated. If the presented material is insufficient, there may be alternative common facts, phenomena, or properties, and the student may be in doubt as to which of these is required. In other words, the facts to be generalised are not sharply distinguished from the others.

For example, students sometimes find a difficulty in deciding upon the classification of oxides, and get confused over a cross-classification into acid, alkaline, and basic. If, however, it is shown that basic oxides which are only slightly soluble possess an alkaline reaction,† it becomes clear to them that, as judged by the tests, there are two main classes—basic and acid—and that the alkaline reaction is given by *soluble* basic oxides. When such a difficulty arises therefore, and the cause can be traced to this point, the only plan is to hark back and enlarge the field of presentation.

At this stage the mind passes from the consideration of concrete and particular cases to abstract and universal truths. If these truths are to obtain a firm hold on the pupil and to play a part in his subsequent mental life, they must be obtained by methods which alone render intellectual advance possible, and the laws of inference ought to be applied with reasonable rigidity. The greatest danger is generalisation from insufficient data, and only in rare cases can the student acquire a sufficient number of facts at first hand from which to draw logically sound conclusions. The field of knowledge is so vast and the time at the disposal of the student too short to enable him to build up his knowledge as a completely rational whole. Some didactic or authoritative instruction must therefore be given, but only as *an extension* of that acquired by the student himself.

The association of facts under general laws is so important for the assimilation and growth of knowledge that it must rightly be made a predominant object of the instruction. But in making these generalisations the teacher should be careful to indicate the nature of the evidence upon which they are based. The facts obtained at first hand should be supplemented by didactic instruction designed to show that, had time allowed, the observed facts might have been extended; and it may be useful in many cases to indicate to the students the books or phenomena in which this extension may be found. The abstraction and generalisation may then be carried out on the *whole of the presented material.*

The student who has not reached general truths is not in possession of a body of *organised* knowledge capable at once of application and of growth. Much of the so-called knowledge of science that students acquire is a mere disjointed body of facts unaccompanied by that conception of *relation* which is essential to rational thought. If it remains in his mind at all, it does so as a conservative element, aiding perhaps to excite a little curiosity occasionally, but failing to maintain and establish intellectual interest in his surroundings. To contribute to intellectual progress within and beyond the limits of the school the student must become as familiar, habitually, with the method as with the results. He must realise—unconsciously it may be—the nature of evidence, the method of inference, the value of a definition or law. And this he can only do properly by being trained in the avoidance of fallacies due to premature generalisation, begging the question, and arguing beside the mark. The primary place has been given to the first of these, because it is the commonest, and its nature has already been indicated. As for the others, it may be observed that the teacher who told his students that "matter is that which has material properties" did not harm them much, but he provided for their amusement when they were subsequently asked what they meant by "material properties." Lest the writer should, in giving this example of "begging the question," be accused of "arguing beside the mark," he may say that it actually occurred, and could be supplemented by others.

5. *Application.*—Knowledge is to be used either in the attainment of further knowledge or in explaining some obscure feature in the pupil's environment. The value of the knowledge acquired needs to be exhibited in its application. From the aspect of growth, the application of the truths just learned frequently marks the aim of the succeeding section. Thus, if the class have discovered that solids expand when heated, they will readily see the desirability of inquiring into the effect of heat upon liquids and gases; or if they have found that bodies burning in air remove one-fifth of the volume, leaving a substance with different properties behind, they will be eager to isolate and examine the properties of the active constituent. In other cases, where the conclusion has been expressed as an equation, this may be applied to numerical calculations. For example,

* An example will be given later.

† MgO is only soluble to the extent of 1 part in 55,000 of water. Yet if a little MgO is placed on a piece of moistened red litmus paper and then washed off it leaves a blue mark.

the co-efficient of expansion of steel having been determined, and the method of calculating the increase of length for any given range of temperature having been grasped by the pupils, they may be set to determine the space between the ends of successive rails in a given length of line. This procedure from concrete and particular to abstract and general, and back again to concrete and particular, adds zest to the pursuit of knowledge. The student is anxious to test his newly-acquired knowledge, and the application gives him confidence.

It should be noted that the quantitative and inductive treatment of both geometry and elementary science furnish a considerable amount of measurement in the "presentation" stage, and to a smaller extent this stage also involves calculation. In the process of generalisation the student obtains practice in making definitions and in establishing algebraical formulæ. The last stage involves practice in using the equations which he has himself established.

In order, finally, to emphasise the importance of the method which has been outlined, it may perhaps be useful to point out some defects in teaching which it will help to avoid. With large classes and young children, such as are found in elementary schools, the processes of abstraction and generalisation are difficult, and there is a tendency to pass from presentation to application. Thus the circumference and diameter of one circle are measured, and the value of the ratio is then used to solve examples. The pupils accept certain information given by the teacher, and acquire a certain amount of arithmetical skill in applying it. But they do not learn how to think, and they get little or no training in those mental habits which are necessary if they are to acquire knowledge for themselves.

Whatever the difficulties may be in the elementary school, the facts that the students in evening schools are over twelve years of age and that the classes are comparatively small render all the five steps possible. The sense of power that comes to a student who has "generalised" from his experiments is of the utmost importance in maintaining his interest, and its omission in the upper standards of some elementary schools may possibly account for the lack of taste for learning which prevents his subsequent attendance at an evening school. For it cannot be too frequently emphasised that learning, and especially learning by doing, is not drudgery.

III.—More Explanations.

The journey to the Promised Land may appear tedious and the result disappointing, but it appears necessary to deal with two or three more points before proceeding to the scheme in detail.

The first matter for consideration is that many of the sections will appear to be complex or incomplete, and the passage from particular to general, and back again to the particular, will either occur several times in one so-called section, or be hidden beneath the details of experiments. Whether these facts are attributed to ignorance, laziness, or sheer carelessness is a matter of supreme indifference to the writer. The indefiniteness is intentional. Any type of teaching used unintelligently is bad, and no method applicable to a variety of conditions can be reduced to a printed plan. A good method may be utterly ineffective in the hands of a bad teacher, and a bad method may yet contain suggestions that may be turned to profitable account in the hands of a good one.

It must be noted, moreover, that the five steps are not confined to one section or a part of one section. There are wheels within wheels. The earlier sections constitute the "preparation" and mark the "aim" of later sections; the whole of the first year's work prepares for the second year's work; and the work of the two years is in itself a "preparation" for the more advanced technical studies which, it is presumed, is the aim of the students under instruction.

This brings us to the second point which requires to be emphasised. A sound system of teaching ought in the main to provide its own revision. Thus the area of a circle will be dealt with in Section 7; it will occur in connection with the volume of a cylinder in Section 10; and the volume of a cylinder will crop up again as part of the instruction in Sections 17, 20, and 21. Between and beyond the special work of these sections the method will be continually exercised in the solution of problems. This plan not only avoids the drudgery of mere repetition by associating it with a new quest, but secures that the whole of the subject-matter shall be welded into a rational whole.

The method common to many books on arithmetic may be compared to that of a carpenter who sharpens a tool, tries it on one or two pieces of wood that lie about, sharpens another tool and tries it on some more odd pieces of wood, and at the end of the day has only a mass of shavings to show for his labour. He has certainly acquired some dexterity, but he lives not so much by his dexterity as by what he does with it. We also shall have to make some chips out of miscellaneous examples, but they will serve the dual purpose of giving confidence in the use of the tool and forming a background of the mind. The examples will not be like the little bits of wood picked up at random, but more like pieces selected with care to bring out the conditions under which the tool can be applied to different materials. To pursue the analogy, the pupil will learn the use of the tool incidentally, while he is acquiring exact and useful experience about oak and ash, walnut and pine.

Permanence of a student's acquisition is, of course, to be aimed at, but it is not obtained by indiscriminate repetition. The essential condition for remembering certain facts is the close association of these facts with other facts in a systematic way, so that the recall of one element of the system brings other elements to mind. Methods, facts, and phenomena which have not recently been presented or used are more difficult to recall than those less remote in time. The plan therefore of revising by questioning the class in the order in which the material was presented is likely to give an unfair impression of the permanence of the teaching. If revision of this sort is necessary, it is more satisfactory to put questions on more recent work and to follow a line backwards along the links of association which it should have been the aim of the teaching to establish.

To return now to the questions to be set, it may be noted that they belong generally to two of the teaching steps—namely, presentation and application. Certain calculations will lead to numerical data from which general laws may subsequently be formulated, but by far the greater number will be applications of these laws to the solution of practical problems. The word practical in this sense is much misused. It must not be assumed that all so-called practical problems are those which men engaged in industrial occupations are frequently making. So much routine is involved in the

management and conduct of most works that the amount of calculation which has to be performed is really very small. Problems, however, which are based on the forces, materials, and contrivances which a man meets with in his daily occupation have a special value in that they render him more observant and give him a more exact knowledge of his environment. But in order to attain this value they must be accurate in respect of the quantity, size, and cost of materials, contrivances, forces, and the amount and cost of labour. An attempt has been made to ensure this in the examples which will be given, but the teacher should always seek his own problems, as far as possible, from what he can learn as to the surroundings and conditions of labour of his own students.

A final point in regard to home work. The main thing to avoid is any appearance of imposing an extra burden upon the students in their own time. Every problem set should have a definite part in the scheme of instruction, and the class should feel this. Then, if the instruction is interesting the home work will be interesting, and there will be no excuse short of sheer impossibility for not receiving it regularly throughout the session.

In the next number we shall pass to the scheme in detail; and if any reader feels, in this or subsequent articles, that any points are obscure, the writer will be glad to reply to him, with the Editor's permission, through the correspondence column.

(To be continued.)

SEASONAL LESSONS IN NATURE STUDY.

BY THE REV. ALFRED THORNLEY, M.A., F.L.S., F.E.S., SUPERINTENDENT OF NATURE STUDY TO THE NOTTINGHAMSHIRE AND LEICESTERSHIRE COUNTY COUNCILS.

ANIMAL STUDY.

The Wild Rabbit—*Continued.*

1. *Why does the rabbit need food?*

(*a*) How the body wears away is shown in many ways. (i.) Loss of weight on fasting; regular variation of weight of body. (ii.) Curious sensations of hunger and thirst and of fatigue.

(*b*) The losses of the body. (i.) Respiration (CO_2 and H_2O). (ii.) Perspiration. (iii.) Urea. (iv.) Waste solid matters.

(*c*) The gains of the body. (i.) Respiration (oxygen). (ii.) Food, which may be divided up into:—

(1.) Proteids: nitrogenous food, containing chiefly carbon, oxygen, hydrogen, nitrogen, and sulphur—for example, white of egg and flesh. (2.) Fats: contain chiefly carbon, oxygen, and hydrogen. (3.) Carbohydrates: contain chiefly carbon, oxygen, and hydrogen, but in a different proportion to the fats—for example, sugars. (4.) Mineral matter (salt). (5.) Water (H_2O).

Note.—The teacher must give a very simple explanation of each of these losses and gains. It is useful to have a small collection of common foods before the children. The loss of *carbon* and *oxygen* as shown in respiration should be demonstrated by means of the usual lime-water experiment.

2. *What the rabbit does with its food.*

The teacher must here explain that the body is built up of millions of tiny *closed* structures called *cells*. (A good diagram of some tissue, or a microscopical slide of the same, should be exhibited.) But the cells being all closed, it is impossible to get solid substances like beef and starch through the cell walls; and even if these foods could be rendered liquid, how is this liquid to pass through walls ordinarily impervious to liquids? And if the food cannot reach the cells, they cannot be fed or repaired. If they are not fed, they will not grow and increase, so the body will be dwarfed or starved.

Experiment with the Thistle Funnel.

Apparatus set up as in diagram (Fig. 1). Dried pig's bladder can readily be purchased. A piece should be tightly tied round the thistle funnel with silk or cotton,

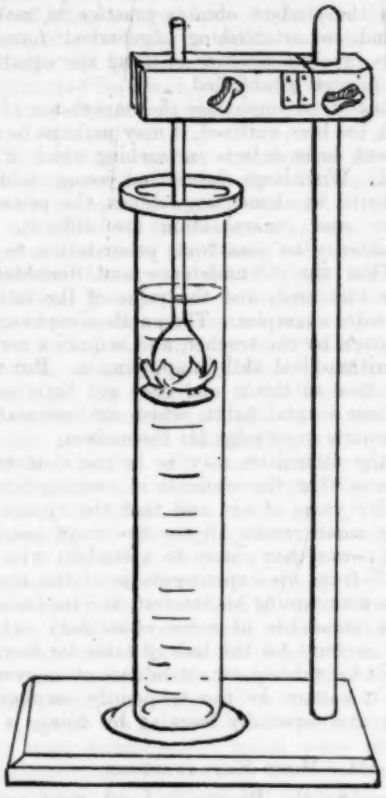


Fig. 1.

and the funnel then filled up to a certain level with strong salt (or sugar) solution. The apparatus must then be so adjusted as to bring the solution in the funnel to the same level as the water in the cylinder. Slowly but surely the level will rise in the funnel, showing that fluid is passing through the bladder, which was previously impervious to liquid. What has caused the difference? Clearly the presence of the crystalline salt in the water. Complete explanation too difficult at present. The phenomenon is called *osmosis*.

Any substance, if it is to feed the body, must be rendered (*a*) *soluble* and then (*b*) *diffusible*. The process of rendering food soluble and diffusible is called *digestion*.

3. *The body's digestive machine.*

The stomach and the intestines are concerned with the digestion of food.

The teacher should draw a rough diagrammatic sketch

on the board of the organs of digestion (see diagram), or with higher standards a frog may be dissected and its organs shown to the class. The differences, however, from the human stomach must be pointed out. Let us see how each part of the machine deals with the food.

(*a*) The lips help to get hold of the food.

(*b*) The teeth chop it up.

(*c*) The saliva mingles with it, and converts hydrocarbons into sugars, which are *soluble* and *diffusible*.

(*d*) The tongue rolls the food well about.

(*e*) The food is next passed down the gullet (*œsophagus*) by contraction of muscles (*peristaltic action*). Explain how a horse drinks.

(*f*) The food enters the stomach; the *proteids* are acted upon by *gastric juice*, which contains a substance called *pepsin*. This converts insoluble proteids into soluble and diffusible *peptones*, which are absorbed.

(*g*) The fats pass into the *duodenum* through the *pyloric* valve; acted upon by *pancreatic juice* and *bile*

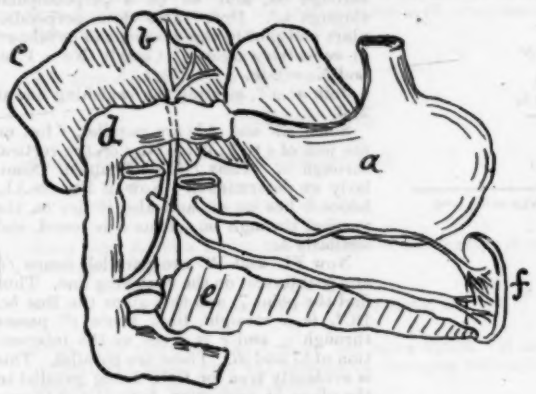


FIG. 2.—THE HUMAN STOMACH.
a, Stomach. *b*, Gall bladder. *c*, Liver. *d*, Duodenum. *e*, Pancreas. *f*, Spleen.

from the liver. An *emulsion* (explain) is formed out of them; they enter the *lymphatic vessels*, and finally the blood.

(*h*) The matter that cannot be rendered *soluble* and *diffusible* passes out of the body.

BOTANICAL STUDY.

THE LIFE HISTORY OF THE BEAN PLANT—*Continued*.

Germination (*continued*).

In order to further illustrate this subject, the following seeds should be germinated, and in the order given: (*a*) onion, (*b*) wheat, (*c*) castor oil or ash. For efficient classwork each child should have the seeds, if possible, in three stages—namely, dry; then softened for dissection; and lastly, sufficiently germinated to show radicle and plumule growing from the seed. In this way only can structures in the ungerminated but softened seed be accurately identified. The lessons should be observational throughout, and the teacher must avoid telling the children too much.

Notes on Germination of above Seeds.

(*a*) *Onion.*—(i.) Place the softened seed on its flat side. Cut it through by a section parallel to the flat side. What do you see? Draw, and note hard black testa, reserve food (*endosperm*), and white embryo embedded in food.

(ii.) Which part of embryo is the radicle? which the plumule? which the cotyledon? Answer by an inspection of the partly germinated seed. Teacher must make all clear by rough diagrams on blackboard.

(iii.) Note the remarkable way in which young onion-plants come out of the ground (the loop). This can be seen at the same time in those seeds which have been allowed to germinate for a week or two.

(iv.) Compare very carefully with bean. What are the differences? what the similarities?

(*b*) *Wheat.*—(i.) Note that a grain of wheat is a *fruit*, not a *seed*. Fruit = seed + seed-box, like a nut. With older children use the word *pericarp* for that part of the seed-box (*ovary*) which surrounds the seed. Draw a transverse section of a grain of wheat (cutting through the embryo) on the blackboard. Colour the *pericarp* blue, the *testa* red, the *endosperm* (flour) white, the *embryo* green. This kind of a fruit in which the *pericarp* clings tightly to the single seed is called a *caryopsis*.

(ii.) Draw the grain of wheat from (1) side, showing the furrow; (2) from the opposite side, showing position of embryo. (3) What do you notice at the apex of the grain?

(iii.) Carefully remove the skin (*pericarp*) from a soaked and slightly germinated specimen. Draw the embryonic structures.

(iv.) Take a specimen which has been germinated until the plumule is about an inch long. Draw carefully.

(v.) By means of a comparison of iii. and iv. answer the following questions: Where is the radicle? where the cotyledon? where the plumule? What has become of the food?

Note.—The teacher will have to explain the function of the *scutellum* and its relation to the cotyledon. A careful series of drawings should be made showing the grain of wheat dry, then slightly germinated, then the bursting out of the first true (flattened) foliage leaf.

(vi.) Compare with bean as to similarities and differences. The stage has now been reached when the teacher can explain to the class the meaning of *dicotyledons* (like the bean) and *monocotyledons* (like onion and wheat).

(*c*) *Castor oil.*—But lest the class should get the idea that all *endospermic* seeds belong to monocotyledonous plants, it is useful to dissect and treat in the same way some seeds like castor oil or ash, which are true dicotyledons.

A careful dissection of these seeds in different stages of germination will show the *two* cotyledons (leaf-like) resting in the reserve food (*endosperm*).

The class must have clear ideas on the difference between food stored in some parts of the embryo—for example, the cotyledons—as in the bean, and food stored externally to the embryo, as in onion, wheat, castor oil, and ash. Food thus placed is called *endosperm*. In botany books such seeds are often spoken of as "albuminous," and others, like the bean, as "exalbuminous."

(*To be continued.*)

TWO USEFUL HANDBOOKS.—Those of our readers who are students of the French language will be interested in Messrs. Marlborough and Co.'s enlarged issue of *French Pronunciation made Easy*, by M. H. Hébert, which is now in its fourth edition. The little book achieves its purpose very successfully. The same firm send us *Esperanto Self-Taught*, with phonetic pronunciation, a practical guide to the thriving universal language which is to obviate the necessity for Dreadnoughts.

Our Query Column.

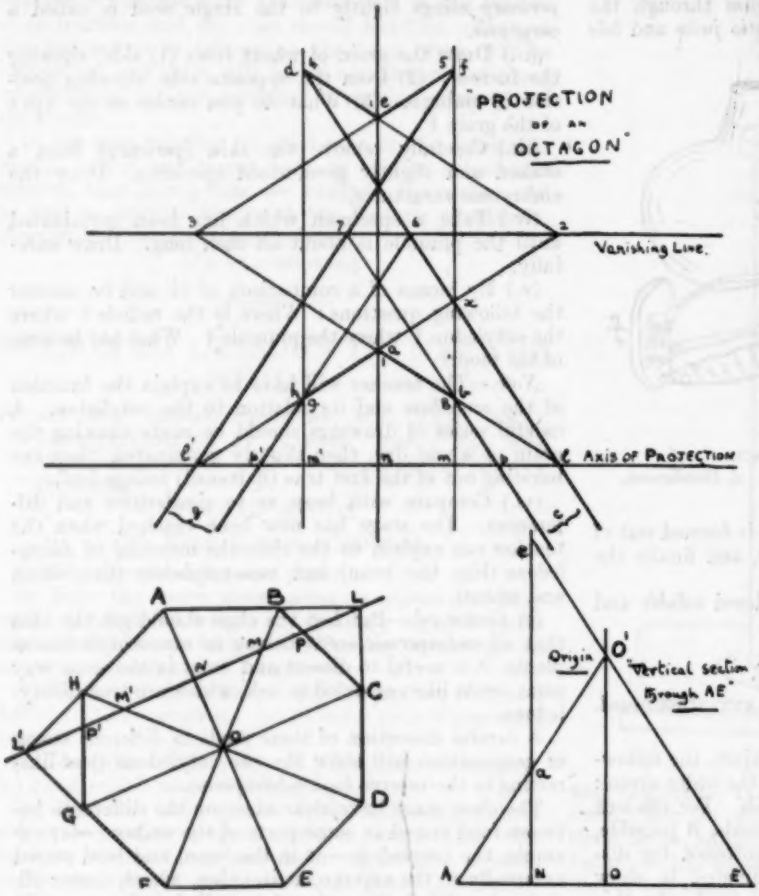
Solutions by A. Clement Jones, M.A., Ph.D., Senior Mathematical Master, Bradford Grammar School.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. Correspondents must in all cases state the source from which their query has been obtained.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

François.—A horizontal regular octagon of side 1 inch is projected from a vertex 2 in. vertically above the centre of the octagon. Draw the projection of the octagon on a vertical plane, bisecting at right angles the ray from the centre to one of the vertices of the octagon. (London B.Sc., 1907.)



ABCDEFGH is the regular octagon, side 1 inch, and the vertical plane of projection cuts it in the line LL′. Let this line cut the various lines in the figure in LL′, MM′, P_1P', and N. Now since LL′ is the line of intersection of the plane of the octagon and the plane of projection, it is the axis of projection, and points on it project into themselves. First, then, draw the axis of projection and plot on it the points l, p, m, n, m', p', l', which are the same as the corresponding points shown with capital letters on the original figure.

Again, a horizontal plane through the origin of projection, being parallel to the plane of the octagon, cuts the plane of projection in the vanishing line: this line is parallel to the axis and distant 2 in. from it. *Parallel straight lines in the original figure project into lines intersecting on the vanishing line.*

Again, any vertical plane through OO′ (origin of projection) cuts the plane of projection in a vertical line. Thus the points corresponding to A and E lie on a straight line through N perpendicular to the axis. Similarly bf lie on a perpendicular to the axis through m, and hd on a perpendicular through m'. Draw these three perpendiculars and plot in the positions of ae (shown in subsidiary figure). Clearly $Na = 1$ in. and $Ne = 2$ in.

Join $a1$, $a'1'$, meeting the vanishing line at 2, 3.

Since EF and AL are parallel, f lies on the join of e to 3; it also lies on the vertical through m. Thus f is determined. Similarly we determine d. Now B lies on AL, hence b lies on $a1$, and also it lies on the vertical through m. Thus b is found, and similarly h.

Now FL′ and BC are parallel, hence fl' and bc intersect on the vanishing line. Thus find the point 7, and this gives the line bc. DCL is a straight line, hence dl passes through c, and c is given as the intersection of $b7$ and dl. These are parallel. This is evidently true for GOC being parallel to the plane of projection, both C and G project to infinity. Construct similarly hg, fg.

The figure ab, bc, cd, de, ef, fg, gh, ha is now complete.

There are several interesting confirmatory tests—

(1) CL, HA, FB are concurrent, hence cl, ha, fb are concurrent. See the point x.

(2) Similarly BC, AE, and GH are concurrent, and in our figure bc, ae, gh are likewise concurrent.

(3) AE, BD, HF are parallel, and it will be found that ae, bd, hf intersect on the vanishing line.

(4) BPC are collinear, so are bpc. This could have been used to find c.

Maths.—Show from graphical considerations that

$$\int_a^b f(x)\,.\,dx = \int_0^{b-a} f(x+a)\,.\,dx,$$

and

$$\int_0^b f(nx)\,.\,dx = \frac{1}{n}\int_{na}^{nb} f(x)\,.\,dx.$$

(Stage VI., 1906.)

Take co-ordinate axes Ox and Oy, and suppose the curve AB (Fig. 1) represents the graph of

$$y = f(x)$$

between the ordinates AL . BM, for which the x co-ordinates are $OL = a$, $OM = b$.

Now by definition

$$\int_a^b f(x)\,.\,dx$$

represents the area enclosed by AL, BM, the curve and the axis of x. We will call this area ALMB.

Let us move the axis of y parallel to itself through a dis-

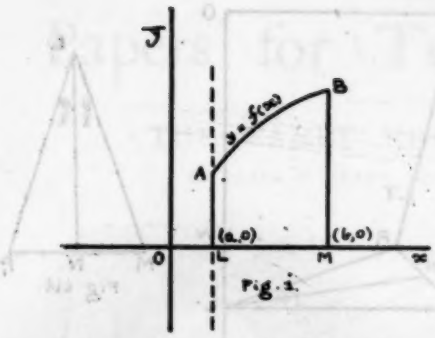


Fig. i.

tance a to the position shown by the dotted line. The new origin is at the point L, which, referred to the original axes, was $(a, 0)$. Now the y co-ordinate of any point on the curve AB is the same referred to the axes Lx, LA as it was referred to the axes Ox and Oy, but the x co-ordinate is decreased by the quantity a. Consequently, if we use X for the x co-ordinate of any point referred to the new axes, the x co-ordinate referred to the original axes is $(X + a)$, hence the common y co-ordinate is given by

$$y = f(X + a).$$

The area ALMB is then equal to

$$\int_0^{b-a} f(X + a) \, . \, dX,$$

since $LM = b - a$. This is identical with

$$\int_0^{b-a} f(x + a) \, . \, dx,$$

since with definite limits the variable of integration is immaterial. Hence

$$\int_a^b f(x) \, . \, dx = \int_0^{b-a} f(x + a) dx,$$

since both represent the area of the same figure. If any difficulty is found with the method of changing the axis of reference, you can proceed thus—

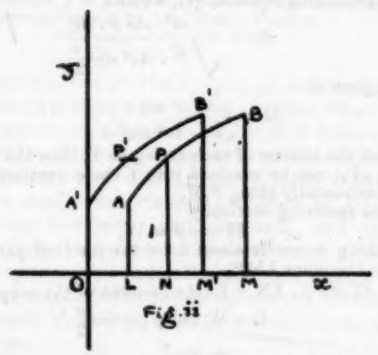


Fig. ii

AB represents, as in Fig. 1, the graph of $y = f(x)$. Let us now draw the graph of $y = f(x + a)$. If any point P on the graph of $y = f(x)$ has co-ordinates $\{x_1, f(x_1)\}$, then there is a corresponding point P′ on the graph of $y = f(x + a)$ —namely, the point whose x co-ordinate is $x_1 - a$, and whose y co-ordinate is consequently $f(x_1)$—that is, the point $\{x_1 - a, f(x_1)\}$. These points have the same ordinate, and it is therefore evident that the graph of $y = f(x + a)$ can be obtained by shifting the figure ALMB towards the axis of y, a distance a to the position OA′B′M′.

Now OA′B′M′, LABM are identical, and their areas are identical—nhmely,

$$\int_0^{b-a} f(x + a) \, . \, dx = \int_a^b f(x) \, . \, dx.$$

In the second part we shall have to compare the two functions given more closely.

In Fig. 3 let CD be the graph of $y = f(nx)$ between the ordinates CA, DB where $OA = a$ and $OB = b$, and further,

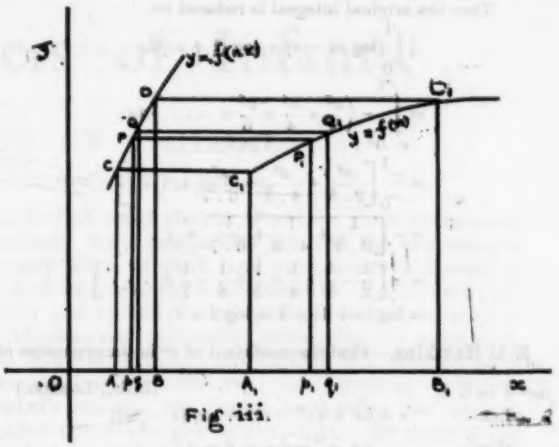


Fig. iii.

let C_1D_1 be the graph of $y = f(x)$ between the ordinates C_1A_1, D_1B_1 where $OA_1 = na$ and $OB_1 = nb$, hence

$$A_1B_1 = nb - na = n(b - a)$$
$$= n(OB - OA) = n \, . \, AB.$$

We have then $CA = f(na)$, $DB = f(nb)$,
and likewise $C_1A_1 = f(na)$, $D_1B_1 = f(nb)$,
hence the ordinates CA, C_1A_1 are equal, and also DB, D_1B_1 are equal.

Divide the distance AB into any number (m) of equal parts, and suppose the area ACDB divided also into m parts by ordinates through the points of section. Let Pp, Qq be the ordinates bounding one of these parts, so that $pq = \frac{b - a}{m}$. Now to the points P, Q on the curve CD there correspond points P_1Q_1 on the curve C_1D_1, having equal ordinates P_1p_1, Q_1q_1—that is,

$$Pp = P_1p_1, \; Qq = Q_1q_1.$$

But since P is on the curve $y = f(nx)$, we have $Pp = f(n \, . \, Op)$, and since P_1 is on the curve $y = f(x)$, we have $P_1p_1 = f(Op_1)$, hence it is evident that $Op_1 = nOp$, and in like manner $Oq_1 = nOp$.

Thus $p_1q_1 = Oq_1 - Op_1 = n \, . \, Oq - n \, . \, Op = n \, . \, pq$.

If we make m very large indeed the area $Ppq Q$ is nearly equal to $Pp \times pq$; so also the area $P_1p_1q_1Q_1$ is nearly equal to $P_1p_1 \times p_1q_1$—that is, to $Pp \times npq$. Hence the area $P_1p_1q_1Q_1$ is practically equal to n times the area $Ppq Q$.

In the limit when m is infinite this is a true equation—namely,

$$P_1p_1q_1Q_1 = n \times Ppq Q.$$

But the area CABD is made up of m such infinitesimal areas, and to each there corresponds an infinitesimal part of $C_1A_1B_1D_1$, consequently

$$C_1A_1B_1D_1 = n \times CABD,$$

or, in the language of the calculus,

$$\int_{na}^{nb} f(x) \, . \, dx = n \int_a^b f(nx) \, . \, dx.$$

Both your solutions are correct. The difficulty which arises in the limits when integrating by the straightforward method can be overcome by strategy. Thus

$$\int_0^{\frac{\pi}{2}} \sin\theta \, . \, \log \sin\theta \, . \, d\theta = \int_0^{\frac{\pi}{2}} \tfrac{1}{2} \sin\theta \, . \, \log \sin^2\theta \, . \, d\theta$$

$$= -\tfrac{1}{2} \int_0^{\frac{\pi}{2}} \log(1 - \cos^2\theta) \, . \, \frac{d(\cos\theta)}{d\theta} \, . \, d\theta$$

$$= (\text{if we put } x = \cos\theta) - \tfrac{1}{2} \int_1^0 \log(1 - x^2) dx$$

$$= \tfrac{1}{2} \int_0^1 \log(1 - x^2) dx.$$

Thus the original integral is reduced to

$$\begin{aligned}
&\tfrac{1}{2}\int_0^1 \{\log(1-x)+\log(1+x)\}dx \\
&=\int_0^1 -\left\{\frac{x^2}{2}+\frac{x^4}{4}+\frac{x^6}{6}+\ldots\right\}dx \\
&=-\Big[\frac{x^3}{2\,.\,3}+\frac{x^5}{4\,.\,5}+\frac{x^7}{6\,.\,7}+\ldots\Big]_0^1 \\
&=-\left[\frac{1}{2\,.\,3}+\frac{1}{4\,.\,5}+\frac{1}{6\,.\,7}+\ldots\right] \\
&=-\left[\frac{1}{2}-\frac{1}{3}+\frac{1}{4}-\frac{1}{5}+\frac{1}{6}-\frac{1}{7}+\ldots\right] \\
&=\log(1+1)-1=\log 2-1.
\end{aligned}$$

R. C. Hawkins.—Find the coefficient of x^n in the expansion of $\dfrac{1}{ax^2+bx+c}$. (B.Sc., London.)

Let $\qquad c+bx+ax^2 \equiv c(1-\alpha x)(1-\beta x)$,

then $\qquad \alpha\beta=\dfrac{a}{c}$ and $\alpha+\beta=-\dfrac{b}{c}$.

Now
$$\begin{aligned}
\frac{c}{ax^2+bx+c} &= \frac{1}{(1-\alpha x)(1-\beta x)} \\
&= \frac{1}{\alpha-\beta}\left\{\frac{\alpha}{1-\alpha x}-\frac{\beta}{1-\beta x}\right\} \\
&= \frac{1}{\alpha-\beta}\left\{\alpha(1-\alpha x)^{-1}-\beta(1-\beta x)^{-1}\right\} \\
&= \frac{1}{\alpha-\beta}\Big\{\alpha(1+\alpha x+\alpha^2x^2+\alpha^3x^3+\ldots\ldots) \\
&\qquad -\beta(1+\beta x+\beta^2x^2+\beta^3x^3\ldots)\Big\}.
\end{aligned}$$

Hence the coefficient of x^n

$$=\frac{\alpha^{n+1}-\beta^{n+1}}{c(\alpha-\beta)}$$

where $\alpha=\dfrac{-b+\sqrt{b^2-4ac}}{2c}$ and $\beta=\dfrac{-b-\sqrt{b^2-4ac}}{2c}$

We cannot develop this result further unless we know whether b^2-4ac is $+\infty$ or $-\infty$. If negative, the result can be simplified by De Moivre's theorem by putting

$$\frac{-b}{2c}=r\cos\theta \text{ and } \frac{\sqrt{4ac-b^2}}{2c}=r\sin\theta.$$

Koko.—A circular ring of radius a and weight W is suspended in a horizontal position by three vertical threads, each of length l attached to points on its circumference. Prove that in order to hold the ring horizontal and twisted through an angle θ, a horizontal couple must be applied to it equal to

$$\frac{W\,.\,a^2\sin\theta}{\left(l^2-4a^2\sin^2\frac{\theta}{2}\right)^{\frac{1}{2}}}.$$

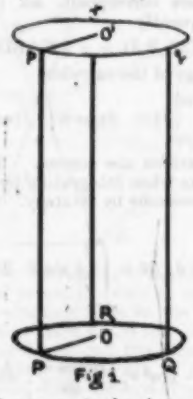


Fig i.

In Fig. 1 PQR represents the ring. Since it hangs horizontally, the threads Pp, Qq, Rr are arranged symmetrically, and the upper ends p, q, r lie on a circle equal to the ring. O, O′, are the centres of the ring and circle, OPpO′ is a vertical rectangle. When the ring is twisted, by symmetry the couple being horizontal, OO′ remains vertical. We shall consider the position of the string Pp.

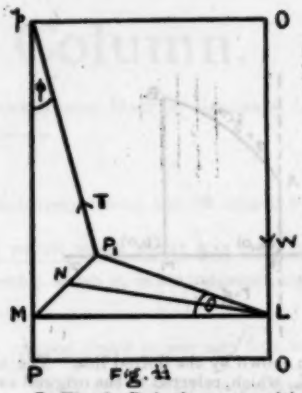


Fig. ii

Fig iii

In Fig. 2 pP_1 is the new position of the string, L the new centre of the ring, hence LP_1 is horizontal and equal to a. pP is the original position, and LM a horizontal line in the plane O′pPO. Join P_1M, and draw LN perpendicular to P_1M. Now, LP_1M is a horizontal plane, and P_1LM is the angle θ through which the ring has been twisted. LMP_1 is an isosceles triangle (see Fig. 3). Now P_1M is horizontal and pM is vertical, hence $\angle pMP_1$ = a right angle.

Hence if OL = x, O′L = $l-x$, and we have

$$\begin{aligned}
pP_1^2 &= P_1M^2+pM^2. \\
&= P_1M^2+O'L^2;
\end{aligned}$$

that is,
$$l^2=4a^2\sin^2\frac{\theta}{2}+(l-x)^2.$$

$$\therefore\ x=l-\sqrt{l^2-4a^2\sin^2\frac{\theta}{2}}. \quad . \quad (1)$$

Also if $\angle MpP_1=\phi$, we have

$$l\sin\phi=2a\sin\frac{\theta}{2}. \quad . \quad . \quad . \quad . \quad . \quad (2)$$

Now, either of two methods is applicable.

1. Suppose a small additional twist $d\theta$ made, then by the principle of virtual work, no work is done by the external forces. If L is the moment of the couple, the work it does is L . $d\theta$. The weight is the only other external force.

Hence $\qquad L\,d\theta=W\,.\,dx.$

Differentiating equation (1), we find

$$dx=\frac{a^2\,.\,\sin\theta\,.\,d\theta}{\sqrt{l^2-4a^2\sin^2\frac{\theta}{2}}},$$

which gives us

$$L=\frac{W\,a^2\sin\theta}{\sqrt{l^2-4a^2\sin^2\theta}}.$$

2. Let the tension of each string be T, then the tension T (along pP_1) can be resolved into T cos ϕ vertically, and T sin ϕ horizontally along P_1M.

Hence resolving vertically

$$3T\cos\phi=W,$$

and taking moments about L for the resolved parts of the force in the plane LMP_1

$$3T\sin\phi\,.\,LN=L \text{ (the moment of the couple).}$$

$$\therefore\ L=W\tan\phi\,.\,a\cos\frac{\theta}{2}.$$

But
$$\sin\phi=\frac{2a\sin\frac{\theta}{2}}{l}.$$

$$\therefore\ L=\frac{W\,.\,a^2\sin\theta}{\sqrt{l^2-4a^2\sin^2\frac{\theta}{2}}}.$$

A somewhat harder but exactly similar example is—

A, B, C, D are four fixed points in the same horizontal plane at the corners of a square whose semi-diagonal is b. A′B′C′D′ are the corresponding corners of a square plate of weight W, and semi-diagonal a. Four equal cords join AA′, BB′, CC′, DD′. When the plate is hanging by the cords the distance between A′B′C′D′ and ABCD is k. Show that if a couple L about a vertical axis be applied to the plate, so that it is turned through an angle θ,

then $\qquad L=Wab\sin\theta/\sqrt{\left(k^2-4ab\sin^2\frac{\theta}{2}\right)}.$

You might also look up the work on "bifilar suspension" in any book on physics, such as Watson's.

Papers for Teachers of Infants.

THE EARLY EDUCATION OF CHILDREN.

BY CLARA E. GRANT, DEVONS ROAD INFANTS' SCHOOL, BOW, E.

MISS LAURA PLAISTED,
Whose new volume, *The Early Education of Children*, has just been published by Mr. Henry Frowde.

OF volumes written on the subject of infant training and school methods for young children there have been many, and in this latest book by Miss Plaisted we have a valuable addition to the series. The writer has had the opportunity of visiting many infants' schools, kindergartens, and lower classes, not only in England, but in France, Germany, and America, and though modestly making "no claim to novelty or originality," she gives a very practical and valuable exposition, written in an easy and attractive style, of the results both of her observation and of their application to her own actual school practice.

THE TEACHER.

The introductory chapter deals with that first essential of the infants' school, the ideal teacher, who should possess "an acquaintance with good literature, especially poetry," a knowledge of children based not only on observational child study but on a knowledge of simple physiology and psychology, a knowledge of the plants and animals familiar to children, some insight into the various forms of educational handwork, and an "elementary study of the history of education in which the life and educational work of Froebel have been emphasised."

Whilst we yield to none in our devotion and gratitude to Froebel, whose teaching, with that of the wiser of his disciples, has helped to revolutionise our methods of infant teaching, we should have liked to see more reference to that other pioneer, Froebel's great predecessor, Pestalozzi, some comparison between the two complementary pieces of work, and some acknowledgment of the debt we owe to the earlier teacher. Pestalozzi's philosophy and system, though perhaps lacking in some of the idealism and spirituality underlying the more mystical mind of Froebel, and lacking the conception of "creativeness" which was the crowning point in Froebel's method, yet tended to develop, we think, a sturdier moral purpose in the child. In some ways, too, Pestalozzi's life with and for his children had more of self-sacrifice about it, and more of that conception of the child's general social needs of life which is now dominating the education of the children of the very poor. He was philanthropist as well as educator, and both elements are necessary if either is to succeed in its purpose.

With Miss Plaisted's high conception of the teacher's calling we have the deepest sympathy, and her plea should help to strengthen that made in the recent "Report of the Consultative Committee on the Attendance of Children under Five" for the best teachers for the youngest children. The plea is especially opportune just now, when a recent circular from Whitehall decrees that teachers considered unfit to teach in senior departments may be relegated to the infants' school! Such a suggestion is enough to make the soul of every earnest infants' teacher burn within her.

THE TEACHER AND THE PARENT.

Miss Plaisted makes a plea, which we heartily endorse, for a more "intimate and cordial" relationship between the teacher and the parent. In the country (and it is obviously from a country school that Miss Plaisted writes) the relationship between the teachers and parents is often much closer than is the case in our larger cities, where a sharp line of demarcation is too often drawn between the school and home life of the child. Probably much of the weakness and failure of our city education, especially in the poorer neighbourhoods, lies in this lack of unified effort between the two main agents at work upon the development of our children.

THE YOUNG CHILD.

In some valuable notes on "The Child" the author makes some wise suggestions on the danger of overpressing the young and growing brain, whose first seven years of growth are so critical and so important; the danger of "repressive discipline" and of fine work involving the straining of the smaller muscles; and the absolute need for plenty of movement.

THE CHILD UNDER FIVE.

Part I. of the book deals in a wise manner with the training of the children under five, the writer endorsing, of course, the recommendations of the Consultative Committee. A valuable section is devoted to the physical training of these young children, and we are glad to see that the writer, whilst recommending

"breathing exercises," wisely pleads for "great watchfulness and care on the part of the teacher." It is here, indeed, that caution is necessary. It is not likely that "physical exercises," as such, will be very interesting to little children, and we can but feel that, under a free and natural system of movement and of speech, the more technical and formal exercises should not be necessary. We here remind ourselves of a characteristic description by Dr. W. Slaughter, in a recent course of lectures, of physical exercises as "a sort of medicine." "Who ever heard," said he, "of a lion taking Swedish drill exercises before breakfast?"

In language training a wise plea is made that the teacher must "allow the child to do most of the talking." For how long have we put "language training" on our time-tables and then said, "Thou shalt not speak"? Obviously children must, in language as in all other things, "learn by doing," and we hope this will be well borne in mind in the coming infants' school. Teachers themselves are not afraid of the children talking; they have been in the past afraid rather of the people who *do* mind the children talking. Some wise control and adjustment of claims for "free speech" must of course be exerted, but the dictum laid down by a teacher of our recent acquaintance must no longer hold good: "Now, children, my voice in school, and yours in the playground."

Nature Study.

Miss Plaisted devotes much attention to the "Nature Interests" of the child, and makes a strong plea for a large variety of animal and plant life in the schoolroom. It is evident that her children are fortunately situated for *natural* Nature teaching, and children living in such an environment gain tremendously in being led by wise guidance and careful steps to the feet of Mother Nature herself. For the children of our slums we heartily agree that Nature must be brought to the child, and as much use made of her beneficent influence as possible; but we doubt whether it is either wise or kind towards the animals to keep pets in captivity under conditions dangerous alike to the pets and to their owners. The Nature study of city children must of necessity differ somewhat from that of rural children, and it is wise to recognise this essential distinction and train each type of child to draw the best from its own environment.

Stories.

The author makes a strong plea for stories as an indispensable factor in training young children, and she rightly pleads that for the "under fives" they should be very simply told and lie largely within their own experience. We think, however, that even with children nearing the age of five the stories of the knights with their knightly qualities are somewhat beyond their grasp. The qualities of, for example, "Sir Percival the Pure," "Sir Tristram the True," and "Sir Gerald the Glad, the thinker of beautiful thoughts," would scarcely appeal to young children, who usually sum up their ideal persons as simply "good and kind." It is possible, too, that they would scarcely appreciate in their fullness the beautiful series of group lessons based on "The Mother Plays" with their "central thoughts," which, however, provide a stimulating and suggestive course of study for the teacher's general practice.

Sense Games.

Some useful and suggestive exercises are given in developing the sense of smell, touch, etc., and with a curriculum freed from the older formal work such exercises may well take a large place.

Colour Teaching,

too, receives very careful attention, though Miss Plaisted gives a not unnecessary warning against over-stimulation in this direction, which may "lead to one-sidedness and a tendency to observe colour and neglect the beauties of form." She quotes Dr. Hains: "A child overtrained to analyse and classify colour might in later life visit an art gallery and make an inventory of colours without getting even a glimpse of a painting as a work of art." Children are naturally dissective as regards the objects and incidents in a picture, and if the tendency is developed to include the colour and form, they may lose the effect of the picture as a whole, and "not see the wood for the trees."

The Work of the Older Infants.

Part II. is devoted to the work of children from five to seven, which, as Miss Plaisted rightly says, must "grow out of the chats and plays of the younger ones." Most of the general principles laid down for the "under fives" will still hold good when they cross the border, but of course the lessons will become greater in length and more strenuous in character.

The Teaching of the Mother Tongue.

In a chapter full of valuable suggestions on the all-important question of the mother tongue Miss Plaisted gives an opportune warning against "irritating interruptions to correct the form of expression," and the still worse restrictions as to "answering in a sentence," by which "the flood of eloquence, so natural in childhood, may be hopelessly dried up." Of course corrections must be made, but, as Miss Plaisted wisely says, "Discretion and common sense are needed to decide whether the sentence or a natural answer shall be accepted." For ourselves, we would certainly plead that the "sentence" should never be insisted upon—for example, in answering in arithmetic; for the child usually has all he can do to think of the number involved, and to make the form of reply also conscious is to confuse the issue and double the effort.

Language Games,

in which certain verbs, for example, are illustrated in action by individual children and described by the class, are suggested; also the constant impression of the necessity for correct speech, emphasised in "speech, lines of poetry, in sentences on the blackboard," and so on. We have ourselves, for example, found a rhyme like "There was a man of York" a valuable aid in teaching "there was" and "they were."

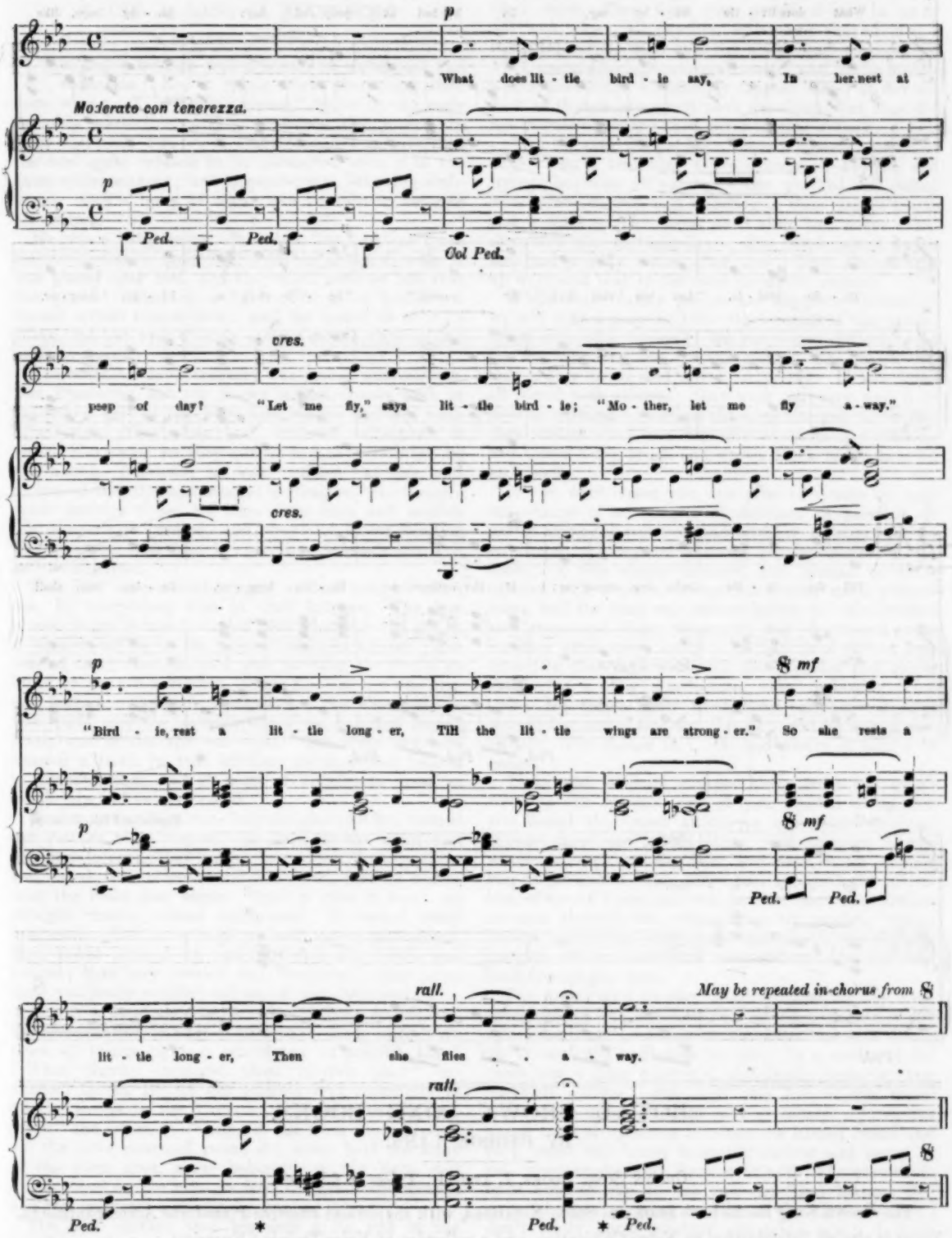
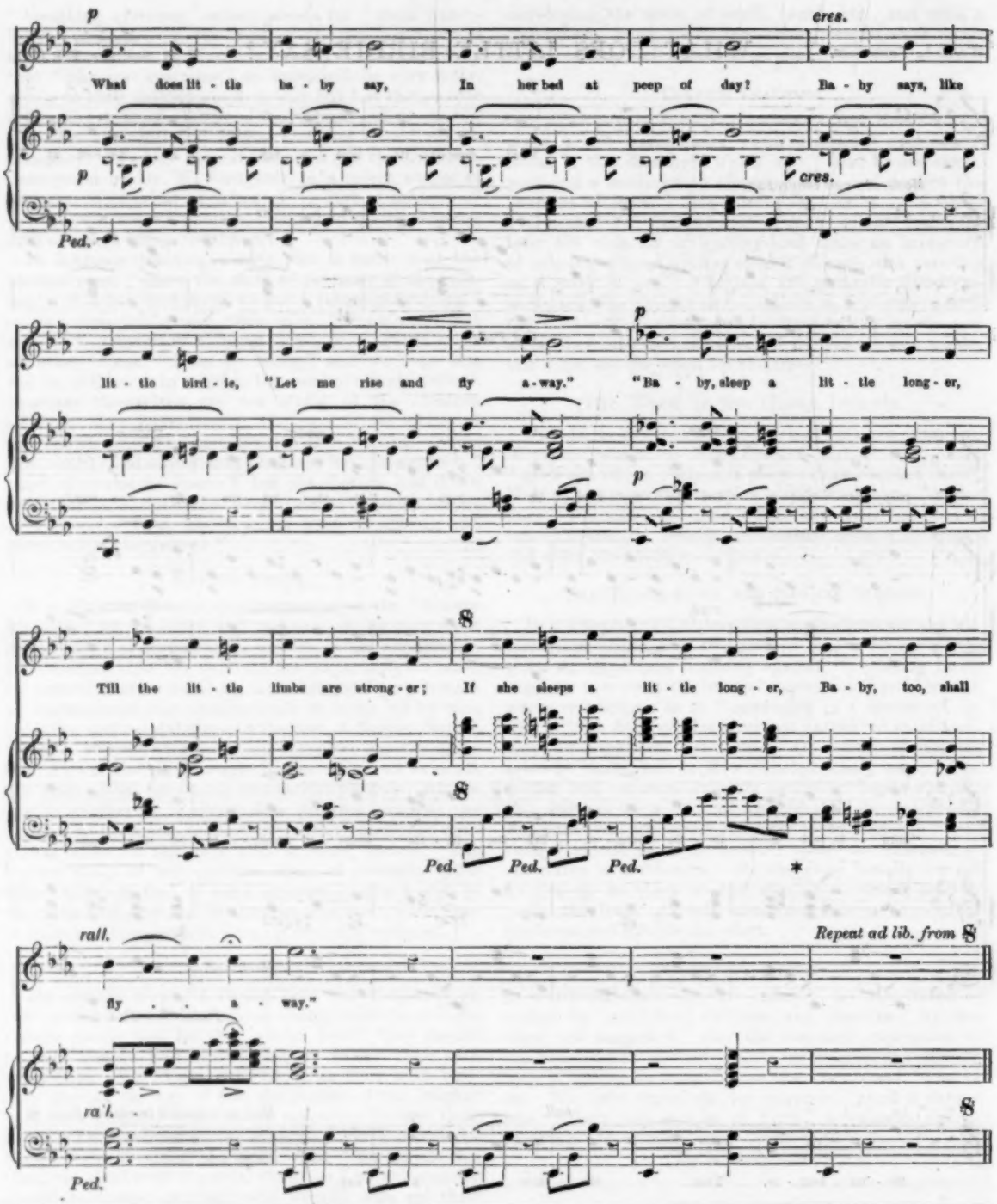
(*To be continued.*)

SCHOOL GERMS.

An interesting experiment in school hygiene has been completed by Mr. W. H. Marsh, Staff Science Instructor of the Buckinghamshire County Council. With a view to the prevention of infectious disease, the floors of twenty-five schools have been sprinkled nightly during the past twelve months with a solution of cyllin, and the attendance in these schools compared with that of the schools in which the process was omitted. Mr. Marsh reports an improved attendance in the disinfected schools sufficient to earn additional grants amounting to over £50, the entire cost of disinfection for the twelve months being under £30.

Words by TENNYSON.

WHÀT DOES LITTLE BIRDIE SAY?

Music by F. H. SQUIRES, F.R.C.O.

p
What does lit - tle bird - ie say, In her nest at
Moderato con tenerezza.
p
Ped. Ped. Ped.
cres.
peep of day? "Let me fly," says lit - tle bird - ie; "Mo - ther, let me fly a - way."
cres.
p
"Bird - ie, rest a lit - tle long - er, Till the lit - tle wings are strong - er." So she rests a
8 mf
p
8 mf
Ped. Ped.
rall.
May be repeated in chorus from 8
lit - tle long - er, Then she flies . . a - way.
rall.
8
Ped. * Ped. * Ped.

p
cres.
What does lit - tle ba - by say, In her bed at peep of day? Ba - by says, like
Ped.
lit - tle bird - ie, "Let me rise and fly a - way." "Ba - by, sleep a lit - tle long - er,
Till the lit - tle limbs are strong - er; If she sleeps a lit - tle long - er, Ba - by, too, shall
Ped. Ped. Ped.
rall.
Repeat ad lib. from 𝄋
fly . . a - way."
ra l.
Ped.

ROYAL CROWN SONG BOOKS.

BY GEORGE LANE.

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A TALE FOR THE STORY HOUR.

"SING A SONG O' SIXPENCE."

BY LILY FRITH.

THE king's kitchen was a scene of untidiness and confusion; for a whole day everything had gone wrong. This "going wrong" began in the early morning when the maid came down, sleepy-eyed, to light the fire. The wood crackled away merrily, but the coal quite refused to be connected with it in the game of fire-making; and he persisted in behaving stubbornly until a lump of sugar was brought to sweeten his temper.

He was a little better after that, but had not quite recovered, for he quarrelled with the kettle directly it was placed near him, and they both grew so hot that the quarrel ended in a fight. The poor kettle got turned almost upside down, and the water, to help its friend, ran out over the fire, and, of course, that settled matters speedily.

The breakfast-table crockery was just as quarrelsome. The cream-jug and the teapot looked crossly each at the other, and at the very first chance knocked each other over. Then they both told the table-cloth it served him right, for they always had to work when he was about. Naturally he was "ruffled" at this, and so caused the cups and saucers to disagree, which really made matters worse for him. The cups and saucers felt they must protest, and they did it by sending their contents over him, to spoil the whiteness of which he was so proud.

This bad temper was caught, as bad tempers often are, by everything else in that kitchen. The last person to get it was the maid, but when she *had* got it, it turned out to be the worst temper of the lot. She was so angry that she said next morning she would go away to her other kitchen, where she did her washing, and leave the things to themselves. She also said she was quite sure the mischievous elves had got among them, and in *that* she was right. The elves had long wanted a frolic in that kitchen, so they had hidden in teapots, jugs, and all sorts of articles to cause as much mischief as they could.

Next morning they were in great glee—all had turned out just as they wished. As soon as the maid had left the kitchen they crept from their hiding-places and raced each other round the room, just to realise that the frolic had begun. Such a race it was: no straight running round and round; it varied every few yards—first heels were up and heads were down, then heads popped up and legs shot out before and behind; then they twirled and "waggled" their arms until you really couldn't tell which each belonged to.

It was a most curious race, but it soon ended, and the elves started to work with a will. They said, "We must set things right as quickly as we possibly can." "What clumsy creatures these mortals are!" exclaimed Queen Elf, as she glanced very scornfully at all the things in the kitchen. "Begin with the fire-grate," she ordered; "bring it out from that corner." All the elves swarmed round it; some held the knob of the oven door, some balanced on the bars, and others stood on the hob—in fact, the grate disappeared and you only saw a struggling mass of elves.

The next instant that big iron grate was in the middle of the room. Those who had moved it had altered its shape, and with tiny paint-brushes were busy changing its colour from black to white. When they had finished they stood a second and looked at their work. They were very proud of it. It really did look nice; all dazzling white and shaped into a beautiful circle, with cunning nooks and corners and wide, useful-looking shelves all round, and in the middle a deep hole fitted with pretty twisted bars. It did not look as though you could cook anything; but that did not matter to elves—they never *wanted* to cook.

"Ah!" said Queen Elf, "that's better; now the pans." In a twinkling those saucepans, kettles, and frying-pans were all painted white, pinched and pulled into dainty shapes, and standing in their proper nooks and corners on the stove, as if they had never stood anywhere else in their lives. The elves joined hands and had a jolly dance after this. They always mix up work and play in the most delightful manner.

While these funny people are enjoying themselves we will take a peep into the other rooms in the palace. There were other rooms? Oh yes!—two of them; one for the king and one for the queen. The king's was only a tiny room, and not a bit pretty. It was fitted all round with shelves; they were on every wall from floor to ceiling, and all just the same size and thickness; they looked when you first saw them as if somebody had taken a big brush and drawn thick black lines on each wall.

If you went closer you saw piles of money on each one—heaps of sovereigns, of shillings, of pennies—all neatly arranged in rows, and without a speck of dust on them. A long table stood in the centre of the room; it was nicely polished, but instead of being covered with a cloth, it was filled with more piles of coins, and the king was sitting before it. He counted and recounted these treasures, and he roared with laughter after every count. He had done this so continuously that he was fatter and rounder and jollier than ever a king was before, even reckoning King Cole. He didn't know what those mischievous elves were doing in his kitchen, not he; and he didn't care either. Why should he? He had plenty of money to count.

There was a short passage along from the king's room to the queen's, and if you tiptoed along this you found the queen sitting in her dainty parlour. It was very nice indeed there, with curtains to the windows, carpet on the floor, and cosy chairs inviting you to sit down. The queen had accepted the invitation of one of them, and was holding back the curtains to gaze through the window at her garden, where, besides having the very nicest flowers you can possibly imagine, she had rows and rows of houses for her dear little friends, the bees.

The queen used to stay in her parlour all day long, except when she just stepped into her garden; and when she wasn't looking at the bees, she was eating the honey they had made for her. In a corner of her room was a huge cupboard, and inside were two tremendous shelves; one shelf was full of big round loaves, the other of large pots of honey. When the queen tired of watching the bees she turned round and took bread and honey from the shelves and began to eat, whether she were hungry or not. She seemed to have nothing else to do, and she liked honey. She never thought of going to talk to the king—in fact I don't really know whether she *could* talk; I don't think anybody ever heard her.

Those elves had had a splendid time in the kitchen; they had climbed and jumped and danced, and now they were singing a queer elfish song. It was like this:—

"Sing-a-song, sing-a-song,
Sing-a-song o' sixpence."

They trilled it very sweetly many times, and moved their bodies to and fro to the tune. Queen Elf nodded to one of them, who immediately jumped on the table and emptied a big bag of rye. She hopped round it on one toe, while the others chanted "A pocket full o' rye."

Another one then brought water in a dainty bowl; and the Queen Elf began to knead and mix, mix and knead, until she rolled out the crust for a lovely pie. She fetched a big dish from the cupboard, and proceeded to catch, one by one, twenty-four of the most mischievous looking elves, and put them in the pie-dish. Of course they pretended they didn't like it, but *really* they liked it very much. Deep down in their hearts—if they had any—they knew they were "in for" some fun.

The rest got very excited. They climbed up the table legs; they danced on the edge of the dish; they laughed and joked with their brothers inside, until the queen swept them all off with her rolling pin, and changed those in the dish into blackbirds by just giving them a little pat on the head with it.

The blackbirds all nestled down snugly, and tucked their heads under their wings in a very bird-like way, considering that it was a trick they had only just learned. That nice thick blanket, the rye pie crust, made a grand covering, and they kept very still beneath it while their little brothers carried the big dish on their shoulders to the king's counting-house. The blackbirds were thinking "inside them" what a good joke it was, and trying to keep their laughing "inside them" too; they found laughter very hard to keep in.

When the king turned round and saw the pie he laughed harder than ever, slapped his knee, thumped his chest, and at last managed to gurgle "dinner-time." He picked up the knife and fork, stuck the latter in the pie, and began to cut. The blackbirds held their heads *very* low just then. He cut out a nice slice of crust, and out of the hole popped the birdies' heads.

The king dropped his knife and fork, opened his mouth—not to eat anything though—and his eyes, and *stopped laughing*. The birds chirped and sang like real birds, only louder, much louder, and after a time the king *laughed* again. While he *was* laughing in hopped their brother elves, and carried them off.

One little elf liked being a bird so much that he begged the queen to let him remain one, which she did. I really think that was the time when blackbirds first learned naughty tricks. I believe he taught the others, being so full of them himself. Why, the very first thing he did was wicked; he hopped through the window into the garden, where the clothes were hanging out to dry, and snapped off the nose of that poor maid whom the elves had made so cross. She ran into her kitchen in a great fright, to find it just as she left it. The elves had all departed, but at the last had turned good, and put things in their proper places.

I do not *know* it for a fact, but I *think* that the poor maid had her nose given back to her after all.

MORAL TEACHING FOR INFANTS AND JUNIORS.

BY MABEL A. BROWN.

Scheme for May.

Central idea—Courage, heroism, and patriotism.

Divisions of Subject.

Week 1. Courage—physical courage, presence of mind, fearlessness in the presence of danger. Instance the training of the Spartan youths to bravery and fearlessness, the training of boys in the navy.

Week 2. Heroism. Brave men of our country—willing to risk their lives for others. Instance soldiers, sailors, firemen, miners, lifeboatmen, etc. Tell stories of the V.C. and the new order for bravery, the medals of the Humane Society, etc.

Week 3. Courage—moral courage a greater force than physical courage. To tell the truth under all circumstances; to be able to say "No;" to stand up for one's convictions. Instance stories of religious persecutions.

Week 4. Patriotism. Empire Day, May 24. Devotion to our country; self-sacrifice; taking a keen personal interest in the affairs of the Empire; thinking imperially. Instance the Boer War, the Territorial Army, the Colonies and British naval defence. Special reference to Japan, one of the most patriotic nations in the world. Japanese people brought up to place their country first. *No* sacrifice is thought too great to be made for their country. Special celebration of Empire Day. Write to Lord Meath for Empire leaflets, catechism, etc.

If there is time, a section might be taken on "Courage in the animal world"—defending their young; braving danger to get their food; faithful dogs and their splendid courage.

Scripture.

Selections may be made from the following: The courage of Moses—standing before Pharaoh and denouncing him, leading the people of Israel through all dangers and privations to the Promised Land (Exodus). The courage of Joshua and the conquest of Canaan (Joshua). The courage of David—before Saul (1 Sam. xvi. 14 to end, and xviii. 1-16), slaying Goliath (1 Sam. xvii.). The courage of Elijah before Ahab (1 Kings xviii. and xxi.). The courage of Nehemiah—rebuilding Jerusalem (Nehemiah, especially iv.). The courage of Daniel—interpreting Nebuchadnezzar's dream (Dan. iv.), rebuking idolatry (Dan. v.), refusing to worship idols (Dan. vi.). The courage of Christ—rebuking the Pharisees (Matt. xvi., xxiii.), before Pilate (Matt. xxvi.), in His crucifixion (Matt. xxvii.).

Hymns.

"Dare to be a Daniel." "Do no sinful action." "God is always near me."

Verse for the Month.

(From "England, my England," by W. E. Henley.)

"Ever the faith endures,
England, my England.
Take and break us; we are yours,
England, my own.

Life is good, and joy runs high
Between English earth and sky.
Death is death; but we shall die
To the song on your bugles blown—
England—
To the stars on your bugles blown."

(For juniors only.)

Stories.

"The Seven Champions of Christendom," "The Story of St. George" (*Books for Bairns*); "Alec and Dulcie," "Saved by a Dog," "Tim's lost Sheep," "Brave Don" (*Tales and Poems for the Kindergarten*); "Tempted" (*Earth's Many Voices*); "Story of George Washington," "Story of Grace Darling" (*The Story Hour*).

Stories of heroism in history—stories of Boadicea, Caractacus, Richard the Lion Heart, the Black Prince, the brave men of Calais, Richard the Second and the peasants, Queen Margaret and the robber, Eleanor of Poitou, Nelson, Sir John Moore, Wellington, Sir Philip Sidney, Florence Nightingale, famous sieges, etc.

Stories of heroism in poetry—"The Wreck of the *Hesperus*" (Longfellow), "The Loss of the *Birkenhead*" (Sir Francis Doyle), "Horatius keeps the Bridge" (Macaulay), "Burial of Sir John Moore" (Wolfe), "The Peel Lifeboat" (Thomas Edward Brown), "Boadicea" (Cowper), "The Great Fire of London" (Dryden). (All these in *English Poetry for the Young*, published by Blackie.) "Hervé Riel," "The Patriot," "Incident of the French Camp" (Browning). "The National Anthem" and "Rule, Britannia!" should be taught. "England, My England," from which I have already quoted, is a most inspiring poem, especially for older children. (*Poems of English History*, published by A. and C. Black.)

The Book of Golden Deeds (Nelson's Sixpenny Classics) gives very many stories of the heroic in history, and includes the heroic deeds of many nations.

Object Lessons.

Coal. The miner's work. The fireman and his dangerous work. The lifeboat and its crew. The lighthouse-keeper and his great responsibility. The soldier. The sailor.

Nature Study.

It is impossible to connect the Nature study for this month with the scheme of work. Pond life is a very good subject for this time of year. The following are suitable for study: The development of a frog. The fish that makes a nest—the stickleback. The transformations of a dragon-fly. The transformations of a caddis-fly. The kingfisher, moor-hen, coot, and swan. The water-vole. The otter. Water plants—crowfoot, bulrush, bur-reed, iris, water-lily, dockweed, milfoil, etc.

Good books on this subject are: *The Brook and its Banks*. By T. Wood. (Religious Tract Society. 3s. 6d.) *Boyhood of a Naturalist*. By Fred Smith. (Blackie. 3s. 6d.) *Country Walks of a Naturalist with his Children*. (Newmann. 3s. 6d.) *Eyes and No Eyes—Book II*. (Cassell. 6d.) Kingsley's *Water Babies* makes a good continuous story in this connection.

Kindergarten Occupations.

Brushwork.—Bulrushes—water scene with swans. Tadpoles in various stages. Bur-reed. Water crowfoot. Irises and water-lilies (juniors only). Stickleback and nest.

Paper-cutting.—A fish. A swan. Bulrushes—in brown and green, mounted on white paper. Paper-cutting picture made by the class of a pond scene.

Drawing.—Juniors: A frog, a kingfisher, the iris. Infants: A dragon-fly, net for fishing, jar for fishing. Free-arm—glass globe for gold-fish.

Clay Modelling.—Ducks and swans. Jar for fish. Stickleback (juniors only).

Colouring (infants only).—A kingfisher.

PETER PAN AND THE FAIRIES.

[Peter Pan, the Boy who Wouldn't Grow Up, is asked where the fairies come from, and he says that the first baby laughter broke in little pieces and the pieces became fairies.]

"Do *you* believe in fairies?"
I asked of Peter Pan.
"Where *is* the fairy country?
Pray tell me if you can."

Young Peter looked quite knowing,
And laughed right merrily.
"As sure as I'm not growing,
The fairies live with me.

"In Never Never Neverland
You'll find them thick as bees;
And, swift as dancing snowflakes,
They fly just where they please."

"Please tell me where they come from.
Where *are* the fairies born?"
Young Peter eyed me sadly,
To think me so forlorn.

"Poor, lonely, grown-up creature,
You really do not know?
'Tis time you had a teacher;
Wherever did you grow?

"Now listen while I tell you;
For really 'tis absurd
That you know nought of fairies—
Hush! do not say a word.

"Where do the fairies come from?
A foolish thing to ask."
Young Peter laughed right gladly.
"Set me a harder task.

"One day a tiny baby
Slept on his mother's knee;
He laughed aloud in Dreamland,
Because he dreamed of me.

"And as the baby laughter
Broke on the summer air,
Each piece became a fairy,
And flew off then and there.

"Since then the first sweet ripple
From every baby's lips
Becomes a dainty fairy,
To Neverland it trips.

"And I'm the King of Fairies;
Come, catch me if you can.
I never, never shall grow up,
For I am Peter Pan."

JESSIE M'KAY, Gateshead.

Our Readers' Column.

STUDIES OF BOOKS THAT ARE WORTH WHILE.

BY SUSAN CUNNINGTON.

II.—The Novels of Charles Kingsley (1850–66).

(*Continued from page 544.*)

THE hero of *Alton Locke*, "Tailor and Poet," challenges at once the spirit of prejudice which resisted the democratic demands of the Chartist reformers. The story is cast in the form of an autobiography, written by its subject whilst imprisoned for inciting to riot. The joyless childhood of the narrator, his apprenticeship to the "sweating tailor" and the miserable years of his life there, his developing ambitions, his political strivings and friendships, the one bright strand of romance woven into the gray tissue of his life, the consuming resentment against injustice which stirs him to throw in his lot with the sufferers instead of seeking to escape from their ranks as he is tempted to do—these are all told with a swift and moving sympathy which carries the reader along. The "seamy side" of the Chartist movement is shown, and the insincere friends, the self-seeking agitator, the unscrupulous journalists of the *Weekly War-whoop* type of paper, are depicted with the certainty of personal knowledge.

The author chooses, moreover, to introduce to the world one of his most tender and simple lyrics, "The Sands of Dee," as the work of Alton Locke. The ideal lady, Lillian, suggests to him to write a song to fit a poignant little air of lamentation she has found, and he is inspired to do it by a careful study of a picture of Copley Fielding's.

In his other novels Kingsley draws upon the historical studies which had always so much fascination for him, and shows us in the most vividly picturesque way the lives and conduct of men and women whose names are little but names to us in history. *Hypatia*, which he refreshed himself by writing five years after the strenuous work of producing *Alton Locke*, takes us back to the fifth century, to what seems like a turbulent dream-world in the Alexandria of Cyril and Orestes. There we see great personages, whose names are just familiar to us, plotting and striving and contesting for empires and seas and dominion over the bodies and minds of men. Widely separated as are ancient Alexandria and nineteenth-century London, there is yet a connecting link of purpose. In the one Kingsley pleaded for the Christian society conscious of brotherhood; in the other for the Christian family united by sacred ties. His fresh, vigorous manhood rebelled against the monastic ideal of the early centuries; and perhaps he did less than justice, in his painting of Arsenius and the Laura, to the reality of the protest against contentment with evil which monasticism succeeded in making.

In *Westward Ho!* we have a picturesque presentment of Elizabethan England, and especially of the men of Devon and the spirit of freedom and adventure which animated them. *Hereward the Wake*, the last to be written, belongs to a period about midway between that of *Hypatia* and that of *Westward Ho!* and reproduces for us the bygone England of Harold and Godwin and the Norman William.

The setting of the story is the semi-royal house of Earl Leofric and the Lady Godiva in their manor at Bourne; the hero their eldest son, Hereward; and the troublous times of the Conquest the background. Although largely a "novel of incident," the working out of the principal characters in their relation to one another is the author's leading motive. The reader's attention is gripped at once with the scenes of Hereward's interview with his mother and his departure from his home, an outlaw. His adventures in Cornwall, in Ireland, with Count Baldwin in Flanders, his first meeting with the beautiful Torfrida, his masterful courting and gallant prowess, his beauty and high spirit, his gift in song and music and all knightly exercises, and withal his growing self-satisfaction and love of boasting, are all depicted in a rushing narrative which stirs the tamest blood.

Quite in the spirit of the old romances is the lovers' quarrel, in which Hereward flings at Torfrida's feet the magic armour, and goes "bare sark" to retrieve his wounded honour; and romance old and new surrounds the joyful surrender of Torfrida when, after the terrifying jest of the great Countess Adela, her hero appears before her safe, sound, and more contemptuous than ever of petty appearances. After their marriage the story continues to glow with splendid deeds and marvellous escapes; but its lines are slowly converging to the climax of Hereward, "last of the English," standing alone against the Norman duke, and presently overcome and humbled.

Thus the external circumstances; and the inner developments show us the strong man meeting with his evil spiritual genius in Alftruda, and his falling away from true knightly faith and honour through a strong man's weakness. Gradually the tragic note deepens, and everything is leading up to the sombre ending. Remorseful, yet not penitent, Hereward chafed under the consciousness of Torfrida in a convent, and Alftruda—her fascination extinct—in her place; and the "Dominus de Brunne cum Marisco" was but a miserable man, without friends and with secret enemies. The assassination, when the sometime fighter calls again his early prowess into action, fulfilled the terrible whisper which had haunted him—"Whoso sheddeth man's blood by man shall his blood be shed;" and the wronged Torfrida, "her beauty passed away, her hair white as snow," challenging guilty power and guilty love, once again held in her arms the fair, comely head of the fallen hero in adoring tenderness and ruth.

> "And past the Deeping, down the Welland stream
> By winding reaches on and shining meres,
> Between gray reed-roads and green alder-beds
> And the brown horror of the homeless fen,
> A dirge of monks and wail of women rose
> In vain to heaven for the last Englishman."

In the telling of the story there is much to appreciate. First and foremost, the minute and masterly descriptions of the Fen country, in which most of the scenes in it are placed. It has often been said that Ruskin first taught his generation to love the sky and to find beauty in it. Kingsley was the first, or almost the first, to discover

the charm of the great level expanse which, resembling the open sea, gives such vastness to the overspread arch of heaven—"such cloudlands, such sunrises, such sunsets, as can be seen nowhere else within these isles." Yet *Hereward the Wake* is not only a novel of place; the characters and the story are the main theme, and their relations with the natural features around them only suggested. It foreshadows the development which later years brought about—in Halliwell Sutcliffe, in Blackmore, in Eden Phillpotts, and in Hardy, whose books illustrate and vitalise Yorkshire and Devon and Wessex.

Next, the gently pedantic footnotes and quotations from history and private records, which make real and impressive the principal personages and their surroundings. With these may be mentioned the examples of alliterative verse, sung or recited by the warrior-bard, and the old English ballads. They give life and variety to the progress of the narrative, and one of the most effective of the many striking scenes in the book is that of Hereward at King Ranald's court singing his elegy on his father.

"Hereward, King, hight I
Holy Leofric my father;
In Westminster wisor
None walked with King Edward.
High minsters he builded,
Pale monks he maintained,
Dead is he: a bed-death,
A leech-death, a priest-death,
A straw-death, a cow's-death,
Such doom suits not me . . ."

It strikes, too, a note of sinister anticipation, to be realised when, standing back to back with Winter, he falls within the ring of thirteen corpses. The introduction of the known characters of history and the intimate aspect shown of each one is either a charm or a defect, according to whether the reader has or has not a different conception of them.

A third point in considering the manner of the author's presentment is that of the variety and colour, the movement and energy of which we are conscious. House-carles at play, monks at prayer, ladies' bowers, travel by road and wood and stream, hospitable halls and military camps, merchants and chapmen, Viking ships and Norman tourneys, magic and fairies, witches and tyrants pass and repass, or are visited or encountered, and together form a vivid picture of that distant, hurrying age.

The most interesting characterisation in the book is that of Martin Lightfoot. From his first entrance, when he is to convey the monks' complaint of Hereward's behaviour to Earl Leofric at Westminster, to the last mention of him, he seems to play something of the part of the fool in Shakespeare. Lady Godiva's words give the keynote, and they are borne out to the end—from "He is too fond of my poor—of Lord Hereward" to the scene of the tall lay brother crooning to the outraged golden head.

Very effective are the prelude, "Of the Fens," and the closing chapter, "How Deeping Fen was Drained," where we hear a later Lord of Bourne resolving with his lady to erect a monument of fair Caen stone to the memory of his illustrious grandparents, Hereward and Torfrida.

NELSON'S SIXPENNY CLASSICS.

This famous Series includes well-printed, well-bound editions of *Westward Ho! Hypatia*, and *Hereward the Wake*.

N.U.T. NOTES.

BY ALLEN CROFT.

FRIDAY, March 19, must be for ever regarded as a genuine red-letter day by all true educationists, for on this date was issued by the Board of Education Circular 709—a document which has already fluttered the dovecots in many localities—where the economist and the obscurantist have long held the upper hand.

The "Good Intentions"

In Sir Robert L. Morant's own words: "The Board aim on the one hand at a reduction in the size of classes such as will afford relief to teachers often seriously overburdened, and secure more individual attention for scholars, and on the other hand at stimulating the employment of teachers possessing superior qualifications;" and I am not afraid to claim that in this way lies the settlement of the *real* "education difficulty."

A week or two before the appearance of the Circular a public deputation from the N.U.T. had waited upon the President of the Board of Education, to lay before him the views of the Executive on a variety of points, the chief of which were—(1) The extensive employment of partially qualified or wholly unqualified teachers; (2) the exceedingly grave position of students leaving the training colleges, a large proportion of whom must, under present conditions, inevitably be "unemployed" for very lengthy periods; (3) the evils of large classes; and (4) the staffing of rural schools. Most complete and admirable arrangements for the deputation had been made by Mr. Ernest Gray, and it was mainly owing to his skill and foresight that not a moment was wasted or an unnecessary word uttered during the interesting proceedings.

Mr. Runciman's reply was on altogether different lines from those usually adopted by the President of the Board of Education. He took fairly voluminous notes of the speakers' arguments, and in a speech characterised by modesty and obvious sincerity, promised to do *something* to make the continued employment by Local Education Authorities of the unqualified teachers unprofitable from a staff value aspect. Personally, I left Whitehall hopeful that some small measure of reform would speedily be promulgated, though I may as well acknowledge at once that, speaking generally, Mr. Runciman has been almost better than his word.

* * *

—of Mr. Runciman.

WITH the solitary exception of the certificated assistant teacher, the staff value of every one mentioned in Article 12(*a*) has been materially reduced—the head-teacher by 15, the uncertificated assistant teacher by 10, the student-teacher by 25, and the supplementary and provisional assistant teacher by 10.

Standing alone, this would be a great reform; yet there are even better things in the Circular. No sillier or less comprehensible proviso has disgraced recent Codes than the present Article 14, which I hope I quote for the last time: "The number of scholars under the instruction of any one teacher should not, except for the purpose of meeting temporary exigencies, exceed by more than 15 per cent. the number entered in the scale of Article 12(*a*) against the grade of teacher in question." Mr. Runciman states definitely that this Article will be withdrawn, and "in its place will be substituted a provision that *the number of scholars on the register of any class shall not exceed* 60," and he,

moreover, promises that this maximum will be subject to further reduction in future Codes.

Educationists everywhere will rejoice to learn that "the standard of examinations for certificated and for uncertificated teachers will be appreciably raised," for I have little doubt that there has been much tempering "the wind to the shorn lamb" of recent years.

Notice is also given that teachers certificated after August 1, 1910, will not be recognised as head-teachers unless they have satisfactorily completed a course of training recognised by the Board under the regulations for the training of teachers for elementary schools, or "acquired such special qualifications as the Board can accept in lieu of such a course of training." This is better than nothing, but, candidly, I do not like the half-threat to make the proviso retrospective, and a much more satisfactory method of dealing with the disinclination to proceed to a training college would be to abolish after next year the Acting Teachers' Examination, and to have one class of certificates only.

There are other important alterations for which I have no space, especially those dealing with supplementary teachers.

As I pen these "Notes" there are many indications that this Circular 709 will be strongly opposed by Local Education Authorities, and all the influence and backing of the friends of popular education must be in evidence if it is to be anything beyond a mere *brutum fulmen*. Personally, I regard the adherence to this measure of staffing reform as the crucial test of the Government's *bona fides* in all that appertains to the welfare of the schools. If the Circular should unfortunately go the way of the three Education Bills introduced during the present Parliament, then, in my humble judgment, *educationally* the Government will be utterly discredited.

OUR COOKERY COLUMN.

BY ROSAMOND CANDY, FIRST-CLASS DIPLOMÉE, NORTHERN COUNTIES SCHOOL OF COOKERY.

CAKE-MAKING.

THE two most important points in ALL cake-making are the *mixing* and the *baking*.

The method of mixing depends upon the *richness* of the cake required. In mixing:—

1. For plain cakes, *rub* the fat into the flour, and then add all the dry ingredients, mixing lightly with the liquid to be used. 2. For rich cakes, cream the butter and sugar together, add the beaten eggs, and finally stir in dry ingredients carefully. 3. For sponge mixtures, the eggs and sugar are beaten thoroughly together until the mixture becomes light and thick, and the flour is lastly *folded* into these. 4. For gingerbread and cakes in which treacle is used, the butter, sugar, and treacle are warmed and then added to the dry ingredients.

Before beginning to make cakes, it is necessary to have *all* ingredients weighed out and ready to mix, and the tins prepared for cooking the mixture. For *plain* cakes the tins must be well greased. For *rich* cakes the tins must be lined with well-greased paper, lard being preferable to butter, as the latter causes the mixture to stick. For *sponge* cakes the tins must be well greased and then lightly dusted with fine sugar and flour. This forms a nice crust to the cake. When fruits, such as currants and sultanas, are used, these should *not* be washed, but rubbed in a cloth with a little flour to remove the stalks. Washing the fruit makes the cakes heavy. Candied peel should be chopped finely. Lemon rind should be grated finely. Raisins should be stoned and cut in half. Eggs should be broken separately into cups to avoid the misfortune of a bad or stale egg being added and spoiling the mixture.

RULES FOR BAKING.

1. The oven must be of a uniform heat. 2. The temperature of the oven should be highest when the cake is put in. The time for baking depends upon the thickness of the cake. Rich, fruity cakes take much longer than the plainer varieties. 3. The heat of the oven should be reduced after the cake is well risen. (When cooking by gas, the oven is very easily regulated, but to keep a steady heat when using a range, a *little* fuel added *often* will be found necessary.) 4. Great care must be taken not to open and shut the oven door too often, as this frequently is the cause of a cake sinking in the middle. 5. When the cake is baked, the centre should feel firm. Test with a knitting-needle, which should come out of the cake *quite clean*. 6. All cakes should be placed on a wire tray or sieve to cool, to allow steam to escape. 7. Cakes baked without tins should be mixed stiffly and cooked in a *quick* oven. 8. Cakes cooked in tins must be mixed rather moist and baked in a *moderate* oven, in accordance to size of cake. 9. Cakes containing much sugar or treacle must be baked in a VERY *moderate* oven. 10. Cakes containing oatmeal must stand awhile before cooking. 11. Cakes, where the lightness depends on the baking-powder, should be placed in the oven as soon as possible after the liquid is added.

RECIPES AS PER METHOD No. 1.

Rock Cakes. *Ingredients.*—One half-pound flour, two ounces butter, two ounces currants, one half-ounce peel, two ounces sugar, one teaspoonful baking-powder, one pinch salt, one egg, two tablespoonfuls milk. *Method.*—Grease baking-sheet. Mix flour, baking-powder, and salt together; rub in the butter; add the sugar, currants, and peel. Beat the egg; add milk to it; and mix the rest of the ingredients to a *stiff paste* with the egg and milk. Pile this mixture in sixteen rocky heaps on the greased tin, and bake in a quick oven about fifteen minutes.

NOTE.—Cocoanut rocks could be made in same way, substituting grated or shredded cocoanut for currants.

Oatmeal Biscuits. *Ingredients.*—Four ounces flour, two ounces oatmeal, one quarter-teaspoonful baking-powder, one egg, two ounces butter, two ounces sugar, two tablespoonfuls milk, one pinch salt. *Method.*—Rub butter into flour; add all other dry ingredients; make into stiff paste with egg and milk; cut into rounds. Bake in a moderate oven for ten minutes.

Raspberry Buns. *Ingredients.*—One half-pound flour, one teaspoonful carbonate of soda, one half-teaspoonful cream of tartar, one pinch salt, two ounces butter or lard, two ounces castor sugar, one egg, one half-pint milk, raspberry jam. *Method.*—Butter a baking-tin. Mix flour, soda, cream of tartar, and salt; rub in the butter; add the sugar; mix egg and milk together and form into dough. Divide the mixture into about a dozen pieces; make a hole in each; put in a little jam and form into balls. Dip these into crystallised sugar, and bake in quick oven for fifteen minutes.

RECIPES AS PER METHOD No. 2 (IN FORM OF LOAVES).

Sultana Cake. *Ingredients.*—Four ounces butter, four ounces sugar, two eggs, vanilla flavouring, six ounces flour, one half-teaspoonful baking-powder, one pinch salt, two ounces sultanas, one and a half ounces candied peel. *Method.*—Line cake-tin with greased paper. Cream butter and sugar; add eggs, previously beaten; mix the flour, baking-powder, and salt; stir into mixture alternately with the sultanas. Place in mould, and bake in moderate oven for three-quarters to one hour.

Cherry Cake is made in exactly the same manner as the above, substituting the cherries for the sultanas. When cold, ice with almond paste and glacé icing. **Seed Cake** is also made as above, substituting caraway seeds and placing three or four strips of candied peel on top of cake before cooking. **Genoa Cake** is made by adding two ounces sultanas, one ounce currants, one ounce candied peel, one ounce raisins, two ounces almonds. The almonds are blanched and chopped and sprinkled on the top of the cake before cooking. **Madeira Cake** is another variety, made by adding grated lemon rind, or any essence preferred, in place of fruit.

Pound Cake or Fruit Loaf. *Ingredients.*—One pound butter, one pound sugar, eight eggs, one and a quarter pounds flour, one teaspoonful baking-powder; rind of lemon, vanilla, almonds (very little of each); one pound currants, one pound sultanas, one pound raisins, one half-pound citron peel. *Method.*—Cream butter and sugar; beat the eggs; prepare fruit; add the eggs, flour, and fruit alternately; lastly the flavourings and baking-powder.

HINTS TO AID THE SUCCESS OF THE ABOVE CAKES.—(1) The creaming of the butter and sugar *must* be thoroughly well done—that is, these must be *beaten* until they become the consistency of *thick cream*. On no account must the butter be *oiled* or melted; herein lies the success of this class of cake-making. (2) The *beating must* all be done before the flour is added. (3) The eggs must be well beaten before adding to the butter and sugar. (4) If the butter and sugar begin to curdle when eggs are added, a little of the flour should be added immediately to prevent this. (5) Never *beat* the flour into the cake, as this makes the cake close and heavy; always stir in flour very carefully and lightly. (6) When the cake is baking and has become browned enough, place a *greased* paper over it to prevent the cake becoming too dark in colour. (7) Another hint to prevent a big loaf, such as pound cake, from burning at the bottom is to place one tin within another, or stand the tin containing the cake in a dripping-tin of coarse salt.

The following are small cakes for afternoon teas, made on the same principle as the loaves:—

Queen Cakes. *Ingredients.*—One quarter-pound butter, one quarter-pound sugar, two eggs, six ounces flour, one half-teaspoonful baking-powder, one tablespoonful cream, two ounces currants, one and a half ounces candied peel or two ounces cherries, one and a half ounces angelica; flavouring. *Method.*—Grease some small fancy tins. Cream the butter and sugar thoroughly; beat eggs; add these to butter and sugar; add flour and fruit alternately; lastly add baking-powder and cream. Bake in moderate oven for fifteen minutes.

Fluffy or Cornflour Cakes. *Ingredients.*—Six ounces butter, one quarter-pound sugar, one half-pound cornflour (Brown and Polson's), one half-teaspoonful baking-powder, vanilla flavouring, one tablespoonful cream. *Method.*—Grease some fancy small tins. Cream the butter and sugar together; add the eggs, well beaten, and stir in the cornflour, baking-powder, flavouring, and cream. Bake in moderate oven for fifteen minutes. Allow to cool before attempting to remove the cakes from the tins, as they are very easily broken and crumbled when hot.

RECIPES AS PER METHOD No. 3.

Sponge Cake. (See January number.) *Ingredients.*—The weight of two eggs in sugar, butter, and flour; one half-teaspoonful baking-powder; flavouring; apricot jam. *Method.*—Prepare tin by greasing and dusting with flour and sugar. Beat the eggs and sugar over a pan of boiling water until quite thick and creamy looking; fold in flour and melted butter; lastly add the baking-powder and flavouring. Bake in moderate oven ten to fifteen minutes. When cooked, split open and spread with apricot jam.

This foundation mixture may be utilised in many ways to form a great variety of fancy cakes, as follows:—

Chocolate Cake.—Add to the sponge mixture one tablespoonful of Cadbury's Bournville cocoa, and when cooked ice the cake with chocolate icing and sprinkle with chopped pistachio nuts. **Walnut Cake.**—Add to sponge mixture a few chopped walnuts, and ice with glacé icing and decorate with walnuts. **Cocoanut Sponge Fingers.**—Bake mixture in a square dripping-tin, and when cold ice with white icing and sprinkle with dessicated cocoanut. **Vanilla Cream Sandwich Cake.**—Bake the sponge mixture, and when cold split in halves and spread with vanilla butter-icing. Put together again, and cover the cake with more butter-icing and decorate with cherries and angelica. **Orange Cake** is made in exactly the same manner, substituting grated orange rind to flavour the mixture, and when cooked ice with orange icing. **Swiss Roll** is made by spreading the mixture thinly in a dripping-tin lined well with greased paper. Cook quickly for five minutes, and have ready some hot jam. Turn out the cake, and spread quickly with jam; roll up while hot; dust over with castor sugar.

(To be continued.)

MODERN SCIENCE NOTES.

BY J. G. M'INTOSH, B.SC., SECONDARY SCHOOL, GATESHEAD.

"MARS AS THE ABODE OF LIFE."

PERHAPS the most romantic of the speculations of modern science are those dealing with the probabilities of life on other planets than our own. In his latest book, *Mars as the Abode of Life*, Professor Lowell treats generally upon the genesis and evolution of worlds, using Mars as an illustration of the various processes—the segregation of small particles, their gradual cooling, the influence of different agencies in shaping the surface, the origin and development of organic life, the gradual evolution of climate, the cooling of the planet until it reaches the point when life upon its surface disappears.

Professor Lowell looks upon Mars as a planet whose evolution has proceeded beyond that of the Earth—a dry globe with widespread regions of polar snows, which, as they melt in spring, are conducted over its surface by huge canals constructed by beings of great intelligence, and visible to us because of the vegetation along their banks. In its evolutionary development Mars has lost its oceans; ours in the course of time will also disappear, and "terrestriality succeed terraqueousness...

"Study of the natural features of the planet leaves us this picture of its present state—a world-wide desert, where fertile spots are the exception, not the rule, and where water everywhere is scarce. So scanty is this organic essential that over the greater part of the surface there is none to quicken vegetation or to support

life. Only here and there by nature are possible those processes which make our Earth the habitable, homelike place we know. In our survey of Mars, then, we behold the saddening picture of a world athirst, where, as in our own Saharas, water is the one thing needful, and yet where by nature it cannot be got. But one line of salvation is open to it, and that remains in the periodic unlocking of the remnant of water that each year gathers as snow and ice about its Poles.....

"The Martian struggle for existence, in the planet's decrepitude and decay, would tend to evolve intelligence to cope with circumstances growing momentarily more and more adverse. But, furthermore, the solidarity that the conditions prescribed would conduce to a breadth of understanding sufficient to utilise it. Intercommunication over the whole globe is made not only possible but obligatory. This would lead to the easier spreading over it of some dominant creature—especially were this being of an advanced order of intellect—able to rise above its bodily limitations to amelioration of the conditions through exercise of mind. What absence of seas would thus entail, absence of mountains would further. These two obstacles to distribution removed, life there would tend the quicker to reach a highly organised stage. Thus Martian conditions themselves make for intelligence."

Lowell proceeds to justify his hypothesis of intelligent life on Mars by pointing out what he considers to be proofs of its existence, the chief evidence being the celebrated canals made for purposes of irrigation. These would be small at first, gradually growing in size as the drying up of the planet proceeded, nations gradually co-operating with each other in the work as the common peril grew greater, until we see a stage of social evolution beyond that of the Earth.

"A sadder interest attaches to such an existence—that it is, cosmically speaking, soon to pass away. To our eventual descendants, life on Mars will no longer be something to scan and interpret. It will have lapsed beyond the hope of study or recall. Thus to us it takes on an added glamour from the fact that it has not long to last. For the process that brought it to its present pass must go on to the bitter end, until the last spark of Martian life goes out. The drying up of the planet is certain to proceed until its surface can support no life at all. Slowly, but surely, time will snuff it out. When the last ember is thus extinguished, the planet will roll, a dead world, through space, its evolutionary career for ever ended."

Lowell does not carry his parallel between Earth life and Martian life as far as this, but the conclusion evidently is that we ourselves must ultimately perish in a similar manner. But the danger is not pressing.

Comparison of Mutual Inductance and Resistance.

Mr. A. Campbell in the *Electrician* describes a method of comparing resistance and mutual inductance simply and directly by the use of two-phase alternating currents. The method was originally embodied in a paper read before the Royal Society.

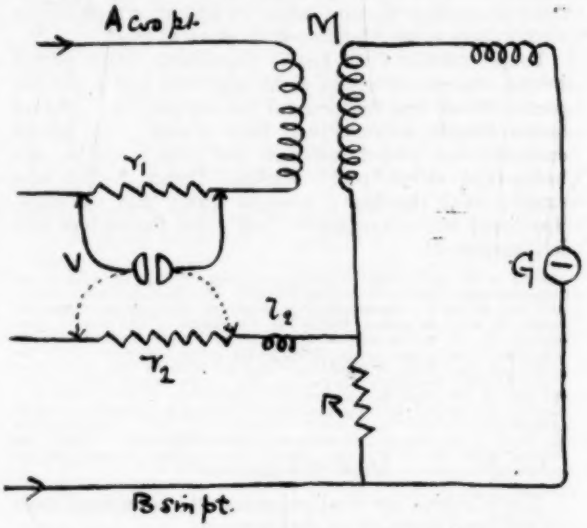
In the diagram M is the mutual inductance (a small fraction of it being adjustable) and R the resistance. Let A cos pt and B sin pt be currents in quadrature. G′ is a vibration galvanometer tuned to frequency n where $p = 2\pi n$. When the galvo shows no deflection the E.M.F. introduced into its circuit is zero at every instant, and hence

$$\frac{d}{dt}(\text{MA as } pt) + \text{RB sin } pt = 0.$$

$$\text{Hence } \text{R} = \frac{\text{A}}{\text{B}} \cdot p \cdot \text{M}.$$

This gives a comparison between R and M when p and $\frac{A}{B}$ are known.

By observing the speed of the alternator, p is found; the ratio $\frac{A}{B}$ may be obtained by an electrostatic voltmeter, V, which is put alternately across the equal resistances r_1 and r_2. In practice A is made very nearly equal to B. The condition of balance is obtained by altering R, M, or p until the galvo deflection is zero, accurate quadrature being maintained by adjusting the self inductance, l_2. For example, if $\frac{A}{B} = 1$ for M = 10 millihenries and R = 5 ohms, the necessary frequency is about 80 cycles per second.



The necessity for obtaining alternating current of exact sine wave form is obviated by the use of the vibration galvanometer tuned to resonance with the fundamental in the wave form, thus ignoring the harmonics in comparison with the fundamentals A_1 and B_1. If necessary, the harmonics may be further eliminated by tuning with inductance and capacity in the galvanometer circuit. A small amount of self-inductance in the resistance R may be neglected, while capacity in the secondary coil may be easily corrected for.

In the preliminary experiments made to test the working of the method exceedingly good results were obtained.

A High Potential Primary Battery.

At a meeting of the Physical Society on March 12 Mr. W. S. Tucker read a paper entitled "Exhibition of a High Potential Primary Battery." The object of the battery is to maintain at known potentials such conductors as the needle of a quadrant electrometer, for charging condensers in capacity and insulation tests, or for calibrating electrostatic voltmeters. It is composed of a large number of elements in series, consisting of carbon and pure zinc with a nearly saturated solution of calcuim chloride as electrolyte. The carbon is a

piece of blacklead pencil 5 cms. long. A strip of zinc foil about 5 mms. wide is bound to one extremity of the carbon by thin copper wire, and the strip is bent so that its other end nearly touches the carbon of the next element. This contact is just broken by paraffin wax. The connected ends are melted into a table of paraffin wax contained in a shallow tray. Elements are mounted in parallel rows, the ends of alternate rows being connected to brass terminals. In the battery exhibited nine hundred of these elements were arranged in series. The table of wax with the elements is then inverted and the exposed ends of the elements dipped in a shallow tray containing the solution, and then withdrawn as quickly as possible. When withdrawn, each carbon zinc pair is now separated by a layer of solution held in place by capillary effect. The hygroscopic nature of the solution prevents it from drying up, and it is found that there is no appreciable chemical waste by local action. When not required for use the battery can be washed free of the exciting solution and dried.

It is found possible to obtain 1·02 volts per element, so that a total of over nine hundred volts was obtained. Since the terminals are well insulated a very steady voltage is obtained, and this has been kept within 0·1 per cent. variation for two hours, and 1 per cent. for half a day, the temperature of the room remaining steady.

The battery is small, cheap, and effective, and a very high internal resistance, so that chemical action is small. Should polarisation take place the elements gradually recover, owing to the depolarising action of the porous graphite exposed to air.

A SCOTTISH EXPERIMENT.

(*Continued from page 536.*)

WITH regard to the subjects included in Schedule V., it is admitted by all inspectors that excellent work is being done, and attention is now being concentrated on Schedule VI., in which great improvements may be expected. It is held that the methods adopted in these subjects are not always those which tend to give the fullest scope to individual initiative and independent work on the part of the pupil. This is considered to be one of the best features of the Supplementary Courses. Greater freedom is given to the individual, and the pupil is made to feel that he is now making a real preparation for the life which lies beyond the school, but at last within appreciable distance. It is maintained that in these courses maturity of judgment and reliance on personal effort are possible. In other words, the pupils attending the Supplementary Courses should be looked upon as students. Large classes, where they exist, defeat the object aimed at in the establishment of these courses. In urban centres this difficulty is not felt to the same extent as in rural districts, for in the latter insufficiency of staff may lead to the headmaster being required to take larger classes.

This leads to the second point to which inspectors have referred. In many cases the classes are overtaught. In rural schools with small staffs this danger is not so great, as by the very circumstances of the case pupils in the Supplementary Courses are more left to themselves, and have therefore to rely more on their own efforts. In this way they are taught more self-reliance and independence of judgment. Learning and being taught are by no means the same thing, and pupils therefore who are silently and earnestly working each at his own particular task are fulfilling the spirit of the regulations which underlie Supplementary Courses.

But the greatest improvement in the future will be the development of more practical work. Here again the difficulties to be overcome are by no means few. The initial cost of greater accommodation and more complete equipment is apt to cause rural School Boards to pause and consider whether they should develop more fully the subjects of Schedule VI. It is suggested that this difficulty can only be overcome by Boards combining to secure the services of peripatetic teachers or by an enlargement of areas. The latter solution seems at the present time to be out of the question, and accordingly many School Boards are looking to the former method.

The difficulty of securing properly qualified teachers in these practical subjects is gradually being overcome by the institution of Teachers' Classes. These are now being largely taken advantage of. The question of accommodation and equipment is, however, more serious. In schools where there can never be a very great number of qualified pupils, School Boards hesitate to make even a small outlay. It is suggested that if the Scotch Education Department desire to make these courses truly successful, they should make a small grant towards the cost of initial equipment. In many districts the burden of the ratepayers is becoming heavier and heavier, and unless the Imperial Exchequer is willing to give some assistance further progress is bound to be limited. The full development of the Industrial Household Management and Rural Courses calls for a larger expenditure, and progress therefore is slow. But even in rural districts satisfactory progress has to be noted.

As the all-important industry of the rural districts is agriculture, the crux of the whole matter in these parts is to bring the pupils of the Supplementary Courses into direct contact with it. One inspector says that if the instruction is to be of any real value, it must be practical; and as far as the boys are concerned, probably the best side from which it can be approached is that of the properly equipped school garden. The Scotch Education Department is contemplating action in this direction. It proposes to place funds at the disposal of the several agricultural colleges, enabling them to send into each county one or more experts, who are to get into touch with the young farmers and with the teachers, and to give assistance in the formation of properly equipped gardens at the rural schools and instruction to the teachers as to their management. Already, it may be remarked, the number of school gardens is very great, and teachers in many districts are devoting themselves with great enthusiasm and earnestness to this branch of practical instruction. In some counties, too, County Committees are helping the formation of these school gardens by granting subsidies. One inspector holds that at the present time, when the splendid openings to be found in the Colonies offer encouragement to country dwellers to resist the attractions of the town, it is more than ever desirable that the potentialities of the Rural Course should be more fully developed. It is considered that a workshop, a school garden, and a cookery-room should form part of the equipment of most country schools.

Along such lines as those indicated will the improvements desired be effected.

Another point that is sure to receive considerable attention in the near future is classification by sex. On this subject we may quote the latest report of one of the inspectors. "In our ideal school," he says, "a large part of the training of the girls in a Supplementary Course should be given by a lady teacher. She knows, as no man can know, their modes of thinking, their special needs and aspirations. She can talk of the books they read with more freedom than a man, and can appeal to sentiments of which he is ignorant. In the greater as well as the lesser moralities of life, the personal influence of a cultured and refined woman exerts 'a double sway.' It is therefore satisfactory to note that in schools where the girls are numerous enough to form a separate class, their instruction in the Supplementary Course is mainly in the hands of lady teachers. The difficulties in the way of this arrangement in small schools are great, but not in all cases insuperable. Needlework is a woman's subject, and the teacher of it is usually one of the ordinary trained staff. It should be possible to utilise her services in at least a part of the work of the course."

The aim of these classes should be to prepare the pupils for Continuation Classes. If the classes are conducted on practical lines, then the Supplementary Courses will dovetail into the curriculum laid down by the Continuation Classes Code, and in this way a larger proportion of the pupils leaving the day schools will find their way, after they leave school, into these classes. The difficulty at present is to get pupils to attach themselves to Continuation Classes immediately they leave the day school. It is only by some such closely articulated system as we have referred to that this can be done. The initial stages of the Continuation Classes frequently dishearten pupils, but if they find that these classes are in reality a continuation of their day-school education, they will be induced to join them more readily. The Continuation Classes should be the technical schools of the great majority of those who leave our primary schools, and when the contact between the two classes of schools becomes more real, the result to the nation will be highly beneficial.

Such is the problem that is at the present time awaiting solution, and indications are not wanting that in the course of a few years a great forward step will have been taken. The question of finance is no doubt a difficult one, but the grants at present given to supplementary classes—fifty shillings per pupil—will no doubt be increased if the work becomes more practical. This, of course, will be conditional on greater equipment and more accommodation.

SUMMER COURSES IN FRANCE AND GERMANY.

We have received the programmes for the present year of two important centres of summer courses—those held at Jena and at Versailles.

The Jena holiday course affords a striking example of the growth of the movement. The first course, in 1889, found only 25 participants, whilst last year 637 students took advantage of the opportunities afforded them of sitting for a short time at the feet of some of the most famous specialists of Germany. This year, courses are provided in natural science, pedagogics, school hygiene, religion, philosophy, history, literature, political economy and social politics, and languages. Under each of these leading divisions a number of courses, varying from three to fourteen, are arranged. Each course deals with some particular aspect of the subject, and so there is a possibility of more or less exhaustive treatment. The courses, which are as usual under the patronage of an international committee, last from August 4 to August 17. As the courses dealing with sections of a subject are, as far as possible, not held at the same time, it is possible for a student to get instruction in those divisions of the subject which most appeal to him. Those who wish to participate in the courses are required to pay an entrance fee of 5 marks. For every course of 12 hours a tuition fee of 10 marks must be paid; for 6 hours' courses, 5 marks. For the courses in natural science, which are held in institutes specially provided for such teaching, or which are accompanied by experiments, a fee half as great again is paid; and for the practical science courses 20 marks are charged. For the language courses, which are spread over a greater number of hours, higher fees, ranging from 15 to 50 marks, are charged. Students who have taken a course before are charged only half-fees, except for the practical lessons in natural science. Board and lodging can be obtained for from 20 to 25 marks per week. Fräulein Clara Blomeyer, Gartenstrasse 4, Jena, will be pleased to send a programme gratis on application.

The holiday courses at Versailles are held as before in the Lycée de Jeunes Filles. There are two courses—either from July 29 to August 21, or from August 23 to September 14. Both deal with the French language, and with the history, civilisation, and art of France. The divisions of each of these courses are practically identical. The literary epochs and classical authors specially studied vary in the two courses, and in the history of French art the works studied are not the same. In each course there is a special subject of study intended to help in the preparation for the London B.A. degree. In the first course Molière is the subject for study, and in the second the comedy and drama of the eighteenth century. French grammar, both as it is and in its origins, composition, reading, and phonetics comprise a very important part of the course. Those who attend the second course have the advantage of hearing a series of lectures on Port Royal, moral teaching in France, the Chateau of Chantilly, ancient music, and the history of the book, by men and women of eminence. Lessons and lectures last from nine to twelve in the morning, the afternoons being devoted to visiting places of interest in Paris and the neighbourhood. At the end of each series, candidates may present themselves for examination for certificates. The elementary certificate testifies to the possession of a practical knowledge of French sufficient for conversation and correspondence; the advanced certificate is only given to candidates who prove they are capable of teaching French. The fees for two series of courses are 100 francs, and for a single series 60 francs. As for board and lodging, ladies can be accommodated in the boarding-houses of the Lycée from July 28 at an inclusive charge of six francs a day. Gentlemen can be put up at the same rate in the Ecole Jules-Ferry. All who desire to enter for one or both of the courses should write to Mme. E. Kahn, Lycée de Jeunes Filles, Versailles, 9 Avenue de Paris.

A LONDON "READER."

At a recent meeting of the English Association one of the speakers asked almost pathetically for a London "reader" which would arouse the living interest of the present small inhabitants of the Metropolis. We could have named off-hand at least three publications which have appeared within the last decade, and now Messrs. Methuen come to the rescue with a volume entitled *A London Reader for Young Citizens*, the work of Dr. Foat of the City of London School. The book is very beautifully illustrated, the pictures including reproductions of four water-colour sketches of distinct charm and high artistic quality, but the really important matter is the text.

Dr. Foat plunges at once into *medias res*, and in spite of the apparent lack of plan we think he is wise. "Here we are, all of us," he seems to say; "now let us look about us and observe." Then he runs on in a pleasant, more or less colloquial style, as he would doubtless talk to a class, with a little apostrophising which reminds us of the Dickens school. "Lambeth Palace!" he cries, in a kind of subdued ecstasy or annoyance, which you will, according as you are Anglican or merely English. "How grand a word is Empire!" Well—it all depends. In spite of these qualities, however, Dr. Foat is, on the whole, genuinely interesting, and when he comes to harmless necessary statistics he warns the reader that he is now going to be rather dry. The historical portion comes at the end, and it is distinctly stimulating and full of suggestions for further inquiry and research.

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French Prize Competition.

1. All French translations **must be received not later than May 6, 1909,** and addressed to:—PRIZE EDITOR, Office of *The Practical Teacher*, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the *coupon* which appears on the Back Wrapper page of the current number. One coupon must be sent for each entry.
3. Competitors should write pseudonym only on MS. Prize-winner will be asked to send name and address for publication.
4. No competitor may take the prize offered more than once in three months.

A Prize of **Half a Guinea** is offered for the best rendering into English of the following extract:—

Le député d'Eauze s'était laissé mourir. Un matin, à l'ouverture de la période électorale, on vit entrer dans la cour de la Bourdette une délégation, petits boutiquiers de la ville et vieux paysans des paroisses avoisinantes; habits endimanchés, mines solennelles, contractées par un effort peu habituel sur des problèmes de l'ordre abstrait.

Monsieur Jacques, dit en substance l'orateur de la troupe, nous venons vous trouver rapport à l'élection. Vous connaissez la situation; on va être mangé par le loup. Ils disent à la ville que l'avocat de Toulouse, ce charlatan qui tourne depuis deux ans dans nos cantons, passera pour sûr s'il n'y a pas un bon candidat. Tous les mauvais sujets sont pour lui; les braves gens ont peur, on a souffert tant d'injustices de ceux qui sont les maîtres! Nous n'avons trouvé personne; tous ces messieurs refusent. Alors nous avons pensé à vous, Monsieur Jacques. Vous avez étudié, vous savez les lois, et toutes leurs manigances, à Paris. Vous avez le bras long. Votre digne père nous a conduits contre les Prussiens, dans le temps; c'est donc bien votre affaire de marcher maintenant à notre tête contre les éhontés qui ont causé tant de misères au pauvre monde. Bien sûr que vous n'êtes pas ambitieux, mais vous ne nous refuserez pas. Comme disait le commandant, on sait qu'il y a de la bonne moelle dans les os des Andarran, depuis le temps qu'ils se les font casser pour le pays. L'assaut surprit Jacques et l'épouvanta. Il avait emporté de sa vie parisienne un grand fonds de scepticisme politique; ses habitudes d'esprit le rendaient fort indifférent sur ce chapitre, il se connaissait impropre à l'action violente et aux passions rectilignes qui la suscitent. Les querelles locales dont ses oreilles étaient chaque jour rabattues n'éveillaient chez lui que dégoût; où prendrait-il le courage de vaincre cette aversion? Où trouverait-il ce qui lui manquait, la dose d'optimisme et de crédulité requise par l'effort qu'on lui demandait, l'incessant et stérile effort du politique pour éterniser des choses qui n'ont pas de durée.

From "Les morts qui parlent," by E. M. DE VOGUÉ.

RESULT OF THE APRIL COMPETITION.

The prize is awarded to "D. M." (Will "D. M." kindly forward name and address for publication?)

First Class.—Oyster, (No pseudonym), T. V. D., Me, Helena, Cuckoo, Timon, Eclaireur, Jean Bonhomme, Thistle, Avrila, O'Hara, Firelight, Quimperlé, Ravenscraig, Jaune-rouge, Athos, Aroer, Yorick, M. M. O'H., Réséda, Menippus, Spero, Beauvais, Débutante, Baryd, Bristol, E. M. T., Hernani, Lolla, Avril, F. M. S., Colenso, Elsie, Aimée, Espérance, Myfanwe, D. E. S. P., La dernière espérance, Junior, E. S, Craig Roasie, Diana, Tim, Lucin, W. H. C., Rursus, Ignatus, Jean Tobie, Winnowaty, Pyth, H. M. E., Eglinton, Essex, H. S. B. A., U. S., Le printemps, Atrides, (No pseudonym), H. E. C., Parkwood, Rosalind, Loch Doon, Patroclus, (Pseudonym illegible), S., St. Oswald's, Crispus, F. A. S., K. A. M., Marie Christine, Mavis, F. B, Pat, Blanc, E. de M., Unicus, Thelma, Damocles, Lethe.

Second Class.—Guamakas, (No pseudonym), A. A. A., Mifanwy, Geebee, St. Dié, Ah!, Emilie, Queen Anne, Primevère, Teffie, Diba, Tulip, Miranda, T. A. M., Horse Chestnut, Gipsy, Lucius Cotta.

"J. M. F.," awarded the prize in the February competition, is Mr. John M. Forsyth, 1 Eastfield Terrace, Dumbarton.

"N. R. M.," awarded the prize in the March competition, is Miss Nettie Roy M'Lellan, Garnock House, Brechin, N.B.

REPORT.

Some very good papers were sent in this month. Most of the errors were on points of detail. The number who translated *solidarité* as "joint liability" or "joint responsibility" was truly remarkable. The translation was evidently taken bodily from a dictionary. Taken with the context *dans l'autre monde*, such renderings as the two we have quoted express no idea which could possibly fit in with the whole sentence. The word *que* before *les cippes musulmans* is the abbreviated repetition of *tandis que*, and not, as some took it, standing for a repetition of *où*. *Cippes* is a small difficulty. Gautier seems to have used this word—coming from Lat. *cippus*, a broken column—as giving an approximate idea of what Turkish gravestones are like. Although short, they are not round, but flat. So far from giving the idea of a broken column, they are finished at the top either with an ornament in the case of a woman, or with a fez in the case of a man.

PRIZE TRANSLATION.

I do not know why the cemeteries of the Turks fail to produce in me the same sadness as Christian cemeteries. A visit to Père Lachaise leaves me for days in a deadly melancholy, but I have spent hour after hour in the burial-grounds of Pera and Scutari without any other sentiment than a vague and gentle dreaminess. Is this indifference to be attributed to the beauty of the sky, the brilliance of the light, and the romantic charm of the setting, or rather to religious prejudices, working unsuspected and breeding contempt for the graves of infidels, with whom one will have no bond of association in the next world? This is what I have not been able to unravel fully, although I have often pondered upon it. Perhaps the cause lies in their sculptures. Catholicism has invested death with a gloomy poetry of fear unknown to Paganism and Mohammedanism. It has placed round its monuments dismal and ghastly forms, composed in a style to cause terror; whilst the urns of the ancients are encircled with lively bas-reliefs, on which graceful sprites are sporting amidst foliage. The Moslem cippi, with their diapers of azure and gold, in the shade of the beautiful trees, seem more like pavilions for eternal repose than dwelling-places of corpses. There on a tombstone I have often smoked my pipe, an act which would seem to me irreverent here, although only a thin slab of marble separated me from the body buried almost at the surface of the soil. More than once have I passed through the graveyard at Pera, under the strangest effects of moonlight, with the white columns standing rigidly amongst the shadows, without my heart quickening a single beat—a feat I could only perform in the Montmartre cemetery with invincible dread, a cold sweat down my back, and nervous tremors at the slightest noise. In the East death is so closely associated with life that one ceases to be terrified by it. "D. M."

La Fée d'Aujourd'hui. Par Mme. Chéron de la Bruyère. Ouvrage illustré de 40 vignettes par Dutriac.

This is a charming study of child life in France. The characterisation is strong, and the interest is well sustained. The "fairy of to-day" is electricity, in the utilisation of which the writer draws considerably on her imagination, but on the whole with pleasing results. The story should be a favourite with younger pupils who can read French fairly well.

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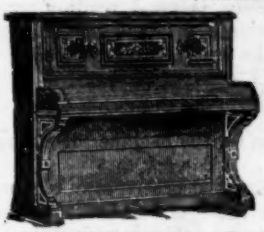

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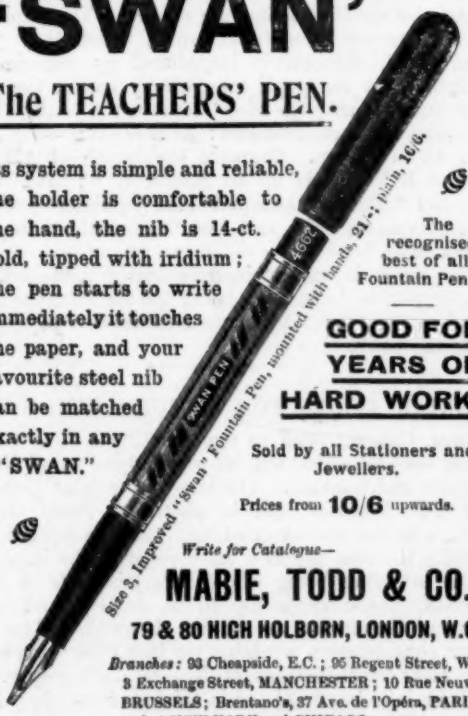

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The Editor's Bookshelf.

NEW MATHEMATICAL BOOKS.

Practical Mathematics and Mensuration. By Frank Castle, M.I.M.E. (Macmillan and Co. 250 pp. 2s.) This book is designed for pupils attending evening continuation schools and technical classes. It is pleasant reading, evidently written by a practical teacher, and should be very useful for this purpose. The author is a disciple of Professor Perry, and claims that his work partakes of the spirit of the "reforms" initiated by him. The author's plan is to make the pupil feel the need of a process before explaining it. The idea is good on paper, but in point of fact the pupil has as much difficulty in allowing the need for finding the volume of a tetrahedron as for the convenient method of calculation.

The book covers a wide range, and the space allotted to some portions is insufficient, and would have been better used in fuller explanation elsewhere. Thus the trigonometrical ratios are dealt with in five pages; they are neither led up to nor applied to "actual problems." On the other hand, the work on indices as a preliminary to logarithms is somewhat thin. There is nothing which gives a pupil more difficulty than passing from 10^0 to, say, $10^{4\cdot771}$. Again, "involution by logarithms" is dealt with by stating a rule and a very special case. The fact that logarithms give only approximate results might have been emphasised. Thus in the illustrative example on involution the author finds the value of 3^2. If the tables given were used, the result would be 8·999 instead of 9—an excellent opportunity to illustrate this fact. We should also have expected that the graphical method of finding logarithms would have preceded the theoretical discussion.

The author no doubt understands the type of pupil he is writing for. He gives more rules than is generally considered wise. For example, on page 79 we find: "To divide a given number in a required ratio, add the two terms of the ratio to obtain a common denominator, and take each number in turn as numerators." There is indeed evidence of a tendency common to works on practical mathematics. The word "obvious" occurs frequently. One feels that difficulties are at times shirked—as with the popular lecturer the audience are apt to be wrongly left with the satisfied assurance that they quite understand. The reader of this book will certainly not be in the state of mind of Mr. Punch's little girl, who exclaimed, "I should understand better if only you didn't explain."

An Introduction to Practical Mathematics. By F. M. Saxelby, M.Sc., B.A. (Longmans, Green, and Co. 220 pp. 2s. 6d.) Mr. Saxelby takes a somewhat different view of practical mathematics from Mr. Castle. His book is, however, also intended for evening students and students of technology. He assumes that such pupils have considerably more preliminary knowledge than Mr. Castle does, and, further, that they are less easily satisfied with a superficial proof of a rule. "Technical students," he writes in his preface, "are more and not, as is sometimes assumed, less willing than schoolboys to take an interest in the reasoning on which the fundamental laws of algebra are based." From our acquaintance with schoolboys we think this is likely, nor does it necessarily indicate any high standard of virtue among evening students. The preface is good reading, and prepares one for the occasional original methods of illustration which occur in the text. It concludes:—

> "'So that the art and practic part of life
> Must be the mistress of this theoric'

is a sound educational maxim for the beginner of mathematics."

We are thus prepared to find the processes of algebra more fully dealt with, and there is less mensuration than is usual in such text-books. The introduction to logarithms contains all the usual difficulties. This part of the subject remains to be written. Theorise how we will, explain however fully, pupils will regard logarithms as a museum product. Even when they can use them easily, the work is often set down in a manner to make the stoutest-hearted master pause. There are excellent chapters on "the plotting of functions" and on the mensuration of irregular figures. We wonder why both of these authors in their work on contracted multiplication reverse the multiplier. It is true that the work so arranged is more mechanical, but the method is unnecessary and artificial. The book concludes with some Board of Education examination papers. This probably explains somewhat the syllabus chosen. The book is sound, and we can confidently recommend it.

Practical and Theoretical Geometry for Schools. By H. Armitstead, B.Sc. (Longmans, Green, and Co. 264 pp. 2s. 6d.) This course of geometry has been written for matriculation candidates at the Calcutta and Madras Universities, and is also suitable for pupils preparing for the Oxford and Cambridge Local Examinations.

The now familiar claims are made: "The pupils are led to discover geometrical truths which they prove later. Each theorem is introduced by experimental work, so that the pupil may wholly realise the truth dealt out. Thus page 28—"Construct a triangle from the following measurements: ACB = CAB = 63°, and base AC = 6·3 cm. Compare the length of AB with that of BC"—leads up to Euclid I. 6; and again, page 19: "Describe an equal-sided (equilateral) triangle with compasses only, and test the length of its sides with a ruler."

The work is rather inconveniently arranged, the "leading-up-to" exercises being too far from the corresponding theorems. Specimen examination papers conclude the book.

SERIAL ISSUES FOR NATURE STUDENTS.

Messrs. Cassell send us two first Parts of new serial issues, both of which will be very helpful to all Nature students and teachers. The larger is entitled *Trees and their Life Histories*, and is edited by Percy Groom, D.Sc., who has endeavoured, to quote the preface, "to consider the tree not as a mere object to be identified, but as a living being whose struggling life is to be watched, whose wants are to be studied, and whose changing lineaments are to be observed." The Part under consideration contains no less than forty-seven very clear reproductions of Nature photographs, and the book is to be completed in thirteen fortnightly Parts at one shilling net each.

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We do not feel sure that the translator has made quite the best of this passage, but the meaning is sufficiently clear. The aim is a comprehensive and an ambitious one, but we feel that there is no hint of failure to realise it in these volumes; rather one must admit that a very full degree of success has been obtained. There is little room for criticism as regards any of the monographs before us. The full knowledge and the ripe judgment of the author are conspicuous throughout. Yet even a pedagogic Homer sometimes nods; for it cannot be by design, surely, that our most distinguished Scottish educationist, Professor John Adams, is referred to as "an English humorist," and his book, *The Psychology of Herbart applied to Education*, as a "humorous volume." We could have excused a "note by the translator" in both cases giving a more adequate characterisation. Indeed, it is in this volume, *Herbart*, that the writer is at his worst. Frankly, one is compelled to admit that, while he gives a fair exposition of Herbart's educational position, he does not understand Herbart, else surely he would have noted something more serious in Professor Darroch's *Herbart and the Herbartian Theory of Education* than merely its "critical tone." And how else can we explain such a position as the following?—"Physiologists may rightly say to Herbart: You neglect and slight the functions of the brain.....You forget that ideas are only conscious manifestations of molecular movements and vibrations of the cerebral masses.....Herbart is wrong." Decidedly it is M. Compayré and his physiologists that are wrong in this instance. What is a "conscious manifestation" of a vibration? Is it "only" a vibration? If it is *not* a physical phenomenon, the physiologist has nothing to say regarding it, either "rightly" or otherwise. But we need not enlarge. Under the simple words, "conscious manifestations of," there lurk all the fallacies which make many otherwise lucid thinkers mistake science for philosophy.

Perhaps we have already allowed a disproportionate space to such criticism. For the books as a whole we have nothing but praise to express.

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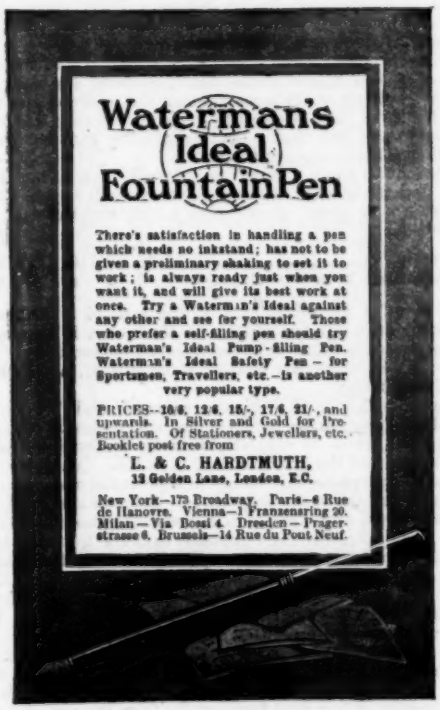
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REVISION QUESTIONS IN MECHANICS.

(*Continued from page 553.*)

40. A man weighing 156 pounds stands on the floor of a lift. Find the pressure he exerts on the floor (*a*) if lift is ascending with an acceleration of 12 feet per sec. per sec., (*b*) if descending with same acceleration, (*c*) falling freely.

41. A 3-ton cage, descending a shaft with a speed of 9 yards per second, is brought to a stop by a uniform force in the space of 18 feet. What is the tension in the rope whilst the stoppage is occurring?

42. A weight of 5 pounds is connected with a weight of 15 pounds by a fine string, and the two weights are so placed that the larger weight rests on a smooth horizontal table, while the smaller hangs over the edge of table. Find the acceleration produced and the tension of the string.

43. Two weights of 14 ounces and 18 ounces are suspended by a fine thread which passes over a small pulley. If the system be left free to move, find how far the heavier weight will descend in the first 3 seconds of its motion. Find also the tension of the string.

44. Explain how Atwood's machine can be used to determine the relation between the acceleration produced by a given force and the mass moved. In an Atwood's machine the string can just stand the weight of 1½ pounds without breaking. If weights of 1 pound each are attached to the two ends of the string, what is the greatest weight that can be used as rider without breaking the string, and what acceleration would it produce?

45. A mass of 10 pounds is, at a given instant, observed to be moving with a velocity of 4 feet per second. Four seconds later it is moving with a velocity of 6 feet per second in the opposite direction. Find the average value of the force that has acted upon it during the interval. What is its increase of momentum, and what is its increase of kinetic energy in foot-pounds?

46. Explain what is meant by work, and say whether any work is done in each of the following cases, giving clear reasons for your answers: (*a*) a pillar supporting a roof, (*b*) a stone at the end of a string being whirled with constant speed in a horizontal circular path, (*c*) an engine drawing a train with constant velocity along a level railway line.

47. A man is pulling a boat by means of a rope. The boat weighs 200 pounds, and is resisted by the water with a force of 10 pounds. The rope is 40 feet long, and each foot weighs 1 pound. Calculate the force the man must exert (*a*) if the boat be moving uniformly, (*b*) if it be accelerated at the rate of 2 feet per sec. per sec. In each case, what is the difference between the force with which the man pulls the rope and that with which the rope pulls the boat?

48. Find the horse-power of an engine which moves at the rate of 45 miles per hour, the weight of the engine and load being 100 tons, and the tractive resistances 20 pounds per ton.

49. A steam crane of 10 h.p. raises a load to a height of 50 feet in 3½ mins. What is the greatest possible weight of the load?

50. What is the horse-power of an engine which can project 10,000 lbs. of water per minute with a velocity of 80 feet per sec., 20 % of the whole work done being wasted by friction?

51. Explain what you understand by potential and kinetic energy. A weight of 420 lbs. is lifted by a force which varies as follows:—

Height above ground in feet..	0	1	2	3	4	5	6	7
Force in pounds.....	700	610	490	390	380	450	650	800

Plot a curve connecting force and height, and hence find the potential and kinetic energy of the body, and the work done by the force when the body is 6·5 feet from the ground. Determine the velocity of the body then.

52. A ½-ton shot is fired with a velocity of 1,600 f.s. from an 81-ton gun. Will the gun or the shot be able to do more work before coming to rest, and in what proportion?

53. A steamer weighing 2,000 tons is proceeding at 20·1 miles per hour. When steam is cut off its speed drops to 19·9 m.h. after it has moved through 200 feet. Find the mean force retarding it. If it speeds up again to its first speed in ¼ min., find approximately the horse-power required.

54. A train weighing 100 tons runs down an incline of 1 in 112, with steam off, at a uniform speed of 15 m.h. Find the kinetic energy of the train, and explain why train is doing no work. On reaching the level, steam is put on to maintain the same speed as before. What is the rate at which the engine is now working?

55. A mass of 8 lbs., moving with a velocity of 40 ft./sec., impinges directly on a mass of 12 lbs. moving in the same direction, with a velocity of 20 ft./sec., and after impact the two masses move on together. Find the loss of kinetic energy.

56. An engine of 64 h.p. draws a load along a horizontal road. The weight of the engine and load is 50 tons, and the frictional resistance 16 lbs. per ton. Find the greatest speed which the engine can maintain.

57. A train moves with a uniform velocity of 30 mls./hr. along a straight, level railway. Explain whether the engine is doing any work. The train comes to the top of an incline of 1 in 224, and steam is cut off. It keeps the same velocity down the incline. Find (1) the resistance per ton to the motion; (2) how far the train would have to run on a straight, level piece in order to be brought to rest.

58. The fly-wheel of a gas-engine has a mass of 1,000 lbs. at a mean radius of 2½ ft., and runs at 200 revs./min. The supply of gas to the engine is stopped at a given instant, and it is found that the fly-wheel comes to rest in ¾ min. Calculate (*a*) the energy stored in the wheel at first; (*b*) the number of revolutions while coming to rest; (*c*) the energy abstracted from the wheel per revolution, assuming this to be the same for every revolution.

59. A ball weighing 2 oz. is dropped from a height of 4 ft. upon a stone floor, and rebounds to a height of 32 in. What fraction of its kinetic energy does it lose during contact with the floor? The same ball dropped from a height of 6 ft. pierces a stretched sheet of paper during its descent, and again rebounds to a height of 32″ after striking the floor. How much work is done in tearing the paper?

60. Masses of 2 and 4 lbs. respectively are attached to the ends of a string passing over a smooth peg. Calculate the loss of potential energy of the system in ft. lbs. while the heavier mass falls through 6″ from rest. Find also the gain in kinetic energy in ft. poundals of the lighter mass during the same period.

61. Explain why in catching a cricket ball the hand is drawn back in "making" the catch. A man in catching a cricket ball of mass 5½ oz., travelling with a speed of 64 ft./sec., draws his hand back through 1 ft. Find the average force that the ball exerts on his hand while coming to rest.

62. A steamer is moving uniformly at the rate of $1\frac{1}{11}$ mls./hr., and a body is dropped on to the deck from a height of 16 ft. Determine the position of the body at the end of each ¼ sec. after the start, and from the results draw a diagram to represent the path of the body during its descent. What is the velocity of the body in magnitude and direction (*a*) when it is just starting to fall, (*b*) ¼ of a second afterwards?

63. Explain how velocities can be represented and combined. Two men, A and B, are 5 mls. apart, A being due west of B. They start walking at the same moment; A walks to the south-east at 4 mls./hr., and B walks at 3 mls./hr. in such a direction as to meet A on his road. Find graphically the two possible times taken for the two men to meet.

64. Define the terms "force" and "work." A spring is compressed, and the relation between the compressive force and the compression is as given below. Find graphically the work done in the process.

Force in lbs.....	0	15	35	65	110	170	300
Compression in inches.....	0	1	2	3	4	5	6

65. A river, ¼ ml. wide, runs at the rate of 3 mls./hr. A boat, rowed at 3 mls./hr. relative to the water, is required to reach the opposite bank at a point ¼ mile lower down. Find the direction in which the boat must be steered, and the time occupied in crossing.

66. Explain the terms "kinetic energy" and "work." A fly-wheel weighing 100 lbs. is 7 ft. in dia., and makes 15 revs./min. Assuming the whole of the weight to be concentrated at the circumference, find the kinetic energy in ft. lbs. Can you suggest a method of converting this energy into potential energy?

67. State and prove the proposition known as the Triangle of Velocities. To a passenger on a ship steaming northwards with velocity 10 mls./hr. the wind appears to blow from the north-west with velocity of 14 mls./hr. Find the true direction and velocity of the wind.

68. A belt, running at a speed of 2,000 ft./min., has a difference of 240 lbs. between the pulls on the tight and slack sides. What horse-power is being transmitted?

69. A body is moving towards the north at 40 ft./sec. In two seconds later we find it moving towards the north at 50 ft./sec. What velocity has been added in these two seconds?

70. A cannon-ball is fired horizontally from the top of a tower 49 ft. high with a velocity of 200 ft./sec. Find at what distance from the tower the cannon-ball will strike the ground.

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